

SAFETY PRECAUTIONS

RE OPERATION

Do not start engine until transmission and control levers are positioned in neutral and handbrake is in position.

Do not attempt to move tractor until air pressure gage indicates minimum of 90 psi.

Do not attempt to push-start on a hill where braking will be required. Brake system may not function until engine has started and compressor has built up proper pressure.

Disconnect battery leads at batteries before disconnecting engine electrical leads.

Do not smoke or use open flame in vicinity when servicing batteries or testing cold weather starting fluid. Batteries generate hydrogen, a highly explosive gas. Prevent starting aid fluid from contacting hot engine parts.

Do not operate engine in an unvented enclosure unless exhaust fumes are piped outside.

Do not move tractor until all personnel have been cleared from tractor and operating areas.

When changing tires stand to the side. The lockring can snap out with enough force to cause serious injury.

Do not weld fuel tanks or hydraulic tank unless all fumes have been expelled. Ground welder to frame at weld point.

Use care during maintenance of oil pump and air brake chamber. Springs and covers can snap out with enough force to cause serious injury.

Replace and secure covers, lids, and guards after performing maintenance checks and services. Stow them properly.

Remove lubricants from hand holds, control handles, catwalks and steps.

When using fire extinguishers avoid breathing fumes and smoke.

NG OPERATION

Look in direction of move prior to initiating movement. Be sure all personnel are clear.

Do not allow personnel to ride on rear half, or stand at swivel point of tractor.

Keep personnel clear of raised blade. Rupture of hydraulic line would cause blade to fall suddenly.

Stop unit and engine when adjustments or servicing is required.

Do not operate tractor in an enclosed area unless exhaust gases are piped outside. Inhalation of exhaust fumes will result in serious illness or death.

Do not smoke or permit an open flame near batteries or fuel tank when servicing.

When using fire extinguisher avoid breathing fumes and smoke. Keep hands, floor, and controls free of grease, oil, or mud to avoid possible serious injury.

OPERATION

Place operating levers in neutral position and set handbrake. Lower dozer blade to ground (when applicable) before stopping engine.

Disconnect battery leads at batteries before disconnecting engine electrical leads.

Replace and secure covers, lids, and guards after performing maintenance checks and services. Stow them properly.

Do not smoke or permit an open flame near batteries or fuel tank when servicing.

Remove lubricants from hand holes, control handles, catwalks and steps.

Do not operate engine in an unvented enclosure unless exhaust fumes are piped outside.

When changing tires, stand to the side. The lockring can snap out with enough force to cause serious injury.

Do not weld fuel tank or hydraulic tank until all fumes have been expelled. Ground welder to frame at weld point.

CHANGE
No. 3

HEADQUARTERS
DEPARTMENT OF THE
WASHINGTON, D.C., 8 July

Operator and Organizational Maintenance Manual

TRACTOR, WHEELED, INDUSTRIAL: DIESEL DRIVEN; MED DBP, W/DOZER, W/SCARIFIER, W/DRAWBAR, TRAILER PINTLE AND HYDRAULIC SCRAPER CONTROLS (CLARK MODEL 290M) FSN 2420-088-9384

TM 5-2420-206-12, 19 March 1970, is changed as follows:

Inside Front Cover. Add the following warnings to the list of safety precautions:

WARNING

Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or ear plugs which were fitted by a trained professional.

WARNING

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F. - 138°F.

Page 1-1. Paragraph 1-2b is superseded as follows:

b. You can help to improve this manual by calling attention to errors and by recommending improvements. Your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) should be mailed direct to Commander, US Army Troop Support Command, ATTN: AMSTS-MPP, 4300 Goodfellow Boulevard, St. Louis, Missouri 63120. A reply will be furnished direct to you.

Page 2-1. Immediately after Chapter 2 title, add the following warning:

WARNING

Operation of this equipment presents a

noise hazard to personnel to the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or ear plugs which were fitted by a trained professional.

Page 3-1. Immediately after Chapter 3 title, add the following warning:

WARNING

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100°F. - 138°F.

Page 3-1, paragraph 3-4. Add subparagraph follows:

f. *Engine Oil Level.* Check crankcase to insure engine has oil in it. Start engine and let idle for five minutes. Stop engine and wait 30 minutes. Check oil level and add oil at this time to bring the proper level on the dipstick.

Paragraph 3-5a is superseded as follows:

a. *Filters.* Service engine oil system filter illustrated in figure 3-1. After servicing, start engine and check filters for leaks. Stop engine. Wait 5 minutes, then check if engine oil level is up to mark on dipstick. Check gages for proper pressure (sheet 1 of 6, fig. 2-7).

Page 3-12. Under "COOLANT SYSTEM" "Security of hardware mounted items", add the following to table 3-1.

Interval				H Before operation		A After operation		M Monthly		
Operator			Once	D During operation		W Weekly		Q Quarterly		
Daily		W	M	Q	Item to be inspected		Procedure		Reference	
B	D									
					Water pump		Remove plug and inspect for lubrication. NOTE Grease cavity in water pump is to be one-half to two-thirds full. If accidentally overfilled, remove fitting to relieve pressure and run engine until a sufficient amount of grease has discharged. Over-lubrication can damage the seal.			

4-1. Immediately after Chapter 4 title, add the following warning:

WARNING

Dry cleaning solvent, P-D-680, used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or

excessive heat. Flash point of solvent is 100°F.- 138°F.

Page A-1, paragraph A-4. Add the following reference: "TB MED 251, Noise and Conservation of Hearing".

Order of the Secretary of the Army:

Official:

ERNE L. BOWERS

Major General, United States Army
Adjutant General

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

ution:
to be distributed in accordance with DA Form 12-52A, (qcy rcp block no. 828) Operator maintenance requirements for Warehousement.

828-67

US ARMY ADJUTANT GENERAL PUBLICATIONS CENTER, ST. LOUIS, MO 12

Change

No. 2

HEADQUA
DEPARTMENT O
Washington, D. C.

**Operator and Organizational Maintenance Manual
TRACTOR, WHEELED, INDUSTRIAL: DIESEL DRIVEN;
MED DBP, W/DOZER, W/SCARIFIER, W/DRAWBAR,
TRAILER PINTLE AND HYDRAULIC SCRAPER CONTROLS
(CLARK MODEL 290M) FSN 2420-088-9384**

TM 5-2420-206-12, 19 March 1970, is changed as follows:

Page 2-1. Paragraph 2-1e is added as follows:

e. A list of maintenance and operating supplies required for initial operation of the tractor in table 2-1.

Table I-1. Maintenance and Operating Supplies

(1) Component designation	(2) Federal specification number	(3) Description	(4) Quantity required 1/8 hour operation	(5) Quantity required 1/8 hour operation	(6) Quantity required 1/8 hour operation	(7) Quantity required 1/8 hour operation
ENGINE CASE	9150420-1099 (2)	OIL, LUBRICATING: 5 gal can as follows: HDO 30	40 qt	(3)	40 qt	(3)
	9150420-1102 (2)	HDO 10	40 qt	(3)	4 qts. oil filter	(3)
	9150-242-7603 (2)	OES	40 qt	(3)	(2) See FSC C91001L for additional data and requisitioning procedure.	(2)
FUEL TANK	9140-286-5294 (2)	FUEL OIL, DIESEL: Bulk as follows: DF-2 Regular Grade	196 gal	(4)	196 gal	(4)
	9140-286-5286 (2)	DF-1 Winter Grade	196 gal	(4)	196 gal	(4)
	9140-286-5283 (2)	DFA, Arctic Grade	196 gal	(4)	196 gal	(4)
ENGINE STARTING AID	2910-565-9424	CYLINDER, FUEL OIL, LUBRICATING: 5 gal can as follows: OE-10	1	(3)	2 oz	(3)
HYDRO CONTROL	9150-265-9428 (2)	OE-10	2 oz	(3)	2 oz	(3)
	9150-242-7603 (2)	OES	2 oz	(3)	2 oz	(3)
OIL TANK RESERVOIR	9150-265-9428 (2)	OIL, LUBRICATING OE-10	2 qt ea	(3)	2 qt ea	(3)
	9150-242-7603 (2)	OES	2 qt ea	(3)	2 qt ea	(3)
OIL TANK BOX	9150-265-9428 (2)	OIL, LUBRICATING OE-10	5 qts	(3)	5 qts	(3)
	9150-242-7603 (2)	OES	72 qts	(3)	72 qts	(3)
TRANSMISSION AND TORQUE CONVERTER	9150-265-9428 (2)	OIL, LUBRICATING OE-10	500	(3)	500	(3)
HYDRAULIC RESERVOIR	9150-242-7603 (2)	OIL, LUBRICATING OE-10	500	(3)	500	(3)

Table 2-1. Maintenance and Operating Supplies -- Continued

(1) Component application	(2) Federal stock number	(3) Description	(4) Quantity required initial operation	(5) Quantity required per hour operation	(6) Notes
DIFFERENTIALS FRONT REAR	6850-174-1806 9150-577-5844 (2) 9150-257-5440 (2)	ANTIFREEZE: 55 gal drum as follows: Compound Arctic LUBRICATING OIL, GEAR, 5 gal drum as follows: GO-90 GOS	84 qts	34½ qts ea	(3)
TIRES FRONT AND REAR		LUBRICATING OIL, GEAR: 5 gal drum as follows: GO-90 GOS	34½ qts ea	(3)	
LUBE POINTS	9150-577-8544 (2) 9150-257-5440 (2) 9150-190-0907 (2)	GREASE, AUTOMOTIVE AND ARTI- LERY: 35 lb pail as follows: GAA	13 qts ea	13 qts ea	(3)

APPENDIX B

BASIC ISSUE ITEMS LIST AND ITEMS TROOP INSTALLED OR AUTHORIZED

Section I. INTRODUCTION

B-1. Scope

This appendix lists items required by the operator for operation of the tractor.

B-2. General

This list is divided into the following sections:

a. *Basic Issue Items List* Section II. Not applicable.

b. *Items Troop Installed or Authorized List* — Section III. A list of items in alphabetical sequence, which at the discretion of the unit commander may accompany the tractor. These items are NOT subject to turn-in with the tractor when evacuated.

B-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items List, Section II, and Items Troop Installed or Authorized, Section III.

a. *Source, Maintenance, and Recoverability Code(s) (SMR)*:

(1) *Source Code*, indicates the source for the listed item. Source codes are:

Code	Explanation
P	Repair parts, special tools and test equipment supplied from GSA, DSA or Army supply system and authorized for use at indicated maintenance levels.
P2	Repair parts, special tools and test equipment which are procured and stocked for insurance purposes because the combat or military essentiality of the end item dictates that a minimum quantity be available in the supply system.

(2) *Maintenance Code*, indicates the lowest level of maintenance authorized to install the listed item. The maintenance level code is:

Code	Explanation
C	Crew/Operator

(3) *Recoverability Code*, indicates whether serviceable items should be returned for repair or salvage. Items not coded are non-recoverable. Recoverability codes are:

Code	Explanation
R	Applied to repair parts (assemblies and components), special tools and test equipment which are economically repairable at direct and general maintenance levels.
S	Repair parts, special tools, test equipment and assemblies which are economically repairable at GSU activities and which normally are furnished by supply on an exchange basis.

b. *Federal Stock Number*. This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. *Description*. This column indicates the Federal item name and any additional description of item required.

d. *Unit of Measure (U/M)*. A 2 character alpha-abbreviation indicating the amount or quantity of the item upon which the allowances are based. ft, ea, pr, etc.

e. *Quantity Furnished With Equipment (if applicable only)*. This column indicates the quantity of item furnished with the equipment.

f. *Quantity Authorized (Items Troop Installed or Authorized Only)*. This column indicates the quantity of the item authorized to be used with the equipment.

g. *Illustration (BIII only)*. This column is divided as follows:

(1) *Figure number*. Indicates the figure number of the illustration in which the item is shown.

(2) *Item number*. Indicates the callout number used to reference the item in the illustration.

Section III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1) Item code	(2) Federal stock number	(3) Ref No & Mfr code	(4) Description	(5) Usable on code	(6) Unit of meas	(7) Qty
	7520-559-9618		CASE, MAINTENANCE AND OPERATION		EA	

By Order of the Secretary of the Army.

W. C. WESTMORELAND
General, United States Army
Chief of Staff.

Official:

VERNE L. BOWERS.

Major General, United States Army,
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25B (qty rqr block no. 489) Operator's Maintenance requirements for Tractor
ed: Medium.

US ARMY ADJUTANT GENERAL PUBLICATIONS CENTER, ST. LOUIS, MO 1985

Operator and Organizational Maintenance Manual

**TRACTOR, WHEELED, INDUSTRIAL: DIESEL DRIVEN; MED DBP,
W/DOZER, W/SCARIFIER, W/DRAWBAR, TRAILER PINTLE AND
HYDRAULIC SCRAPER CONTROLS (CLARK MODEL 290M)**
FSN 2420-088-9384

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CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual contains instructions for the use of operating and organizational personnel maintaining the Clark Tractor Model 290M as allocated by the Maintenance Allocation Chart. It provides information on the operation, lubrication, preventive maintenance checks and services of equipment, accessories, components and attachments. It provides organizational maintenance of the equipment, shipment and administrative storage, and destruction to prevent enemy use.

b. Repair parts for organizational maintenance are listed and illustrated in TM 5-2420-206-20P. Refer to TM 740-90-1 (Administrative Storage of Equipment), for information and instructions pertaining to organizational administrative storage.

c. Refer to TM 750-244-3 (Procedures for De-

struction of Equipment to Prevent Enemy Use) for information and instructions on destruction of equipment to prevent enemy use.

1-2. Forms and Records

a. DA Forms and procedures used for organizational maintenance will be only those prescribed by TM 38-750, Army Equipment Record Procedures.

b. Report of errors, omissions and recommendations for improving this publication by the user dual is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes in Publications) and forwarded to Commanding General, U. S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

Section II. DESCRIPTION AND DATA

1-3. Description

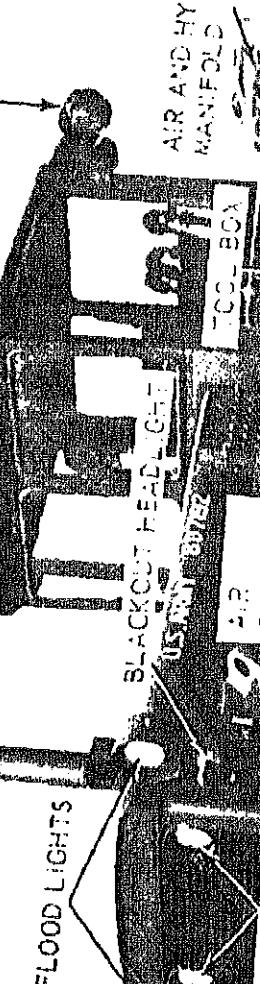
a. The Clark Tractor Model 290M, figures 1-1 and 1-2, is a four wheel drive, hinged frame, industrial tractor, powered by a 6-cylinder, valve-in-head, diesel engine equipped with a turbocharger for operation of equipment at all altitudes. A hydraulically operated bulldozer/scraper is attached to the tractor. Batteries supply 24 volt direct current power for starting tractor, lights, and engine controls. Refer to wiring diagram, figure 1-3.

b. The air system supplies controlled air pressure to individual air/hydraulic brake chambers. It applies pressure to each tractor wheel brake. The system also supplies air to brakes of towed vehicles. Refer to tractor air system, figure 1-4.

c. The tractor hydraulic system supplies controlled oil pressures to activate steering, bulldozer, and towed vehicle (scraper) cylinder assemblies. Refer to hydraulic system, figures 1-5 and 1-6.

d. Refer to figures 1-7 and 1-8 for engine and fuel lines and fittings diagrams.

REAR FLOOD LIGHTS (2)



AIR AND HYDRAULIC SYSTEM
MANIFOLD

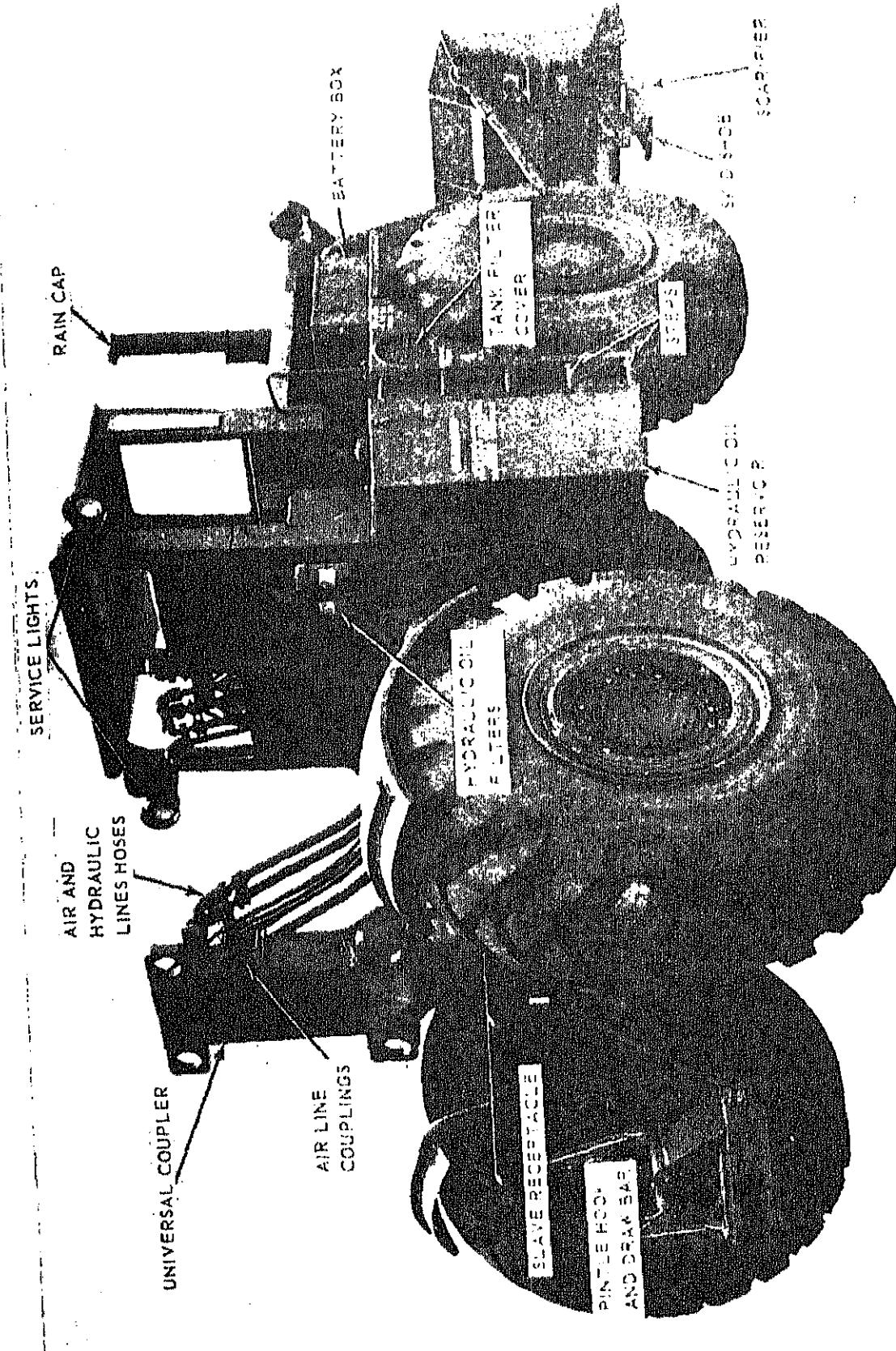
FUEL TANK

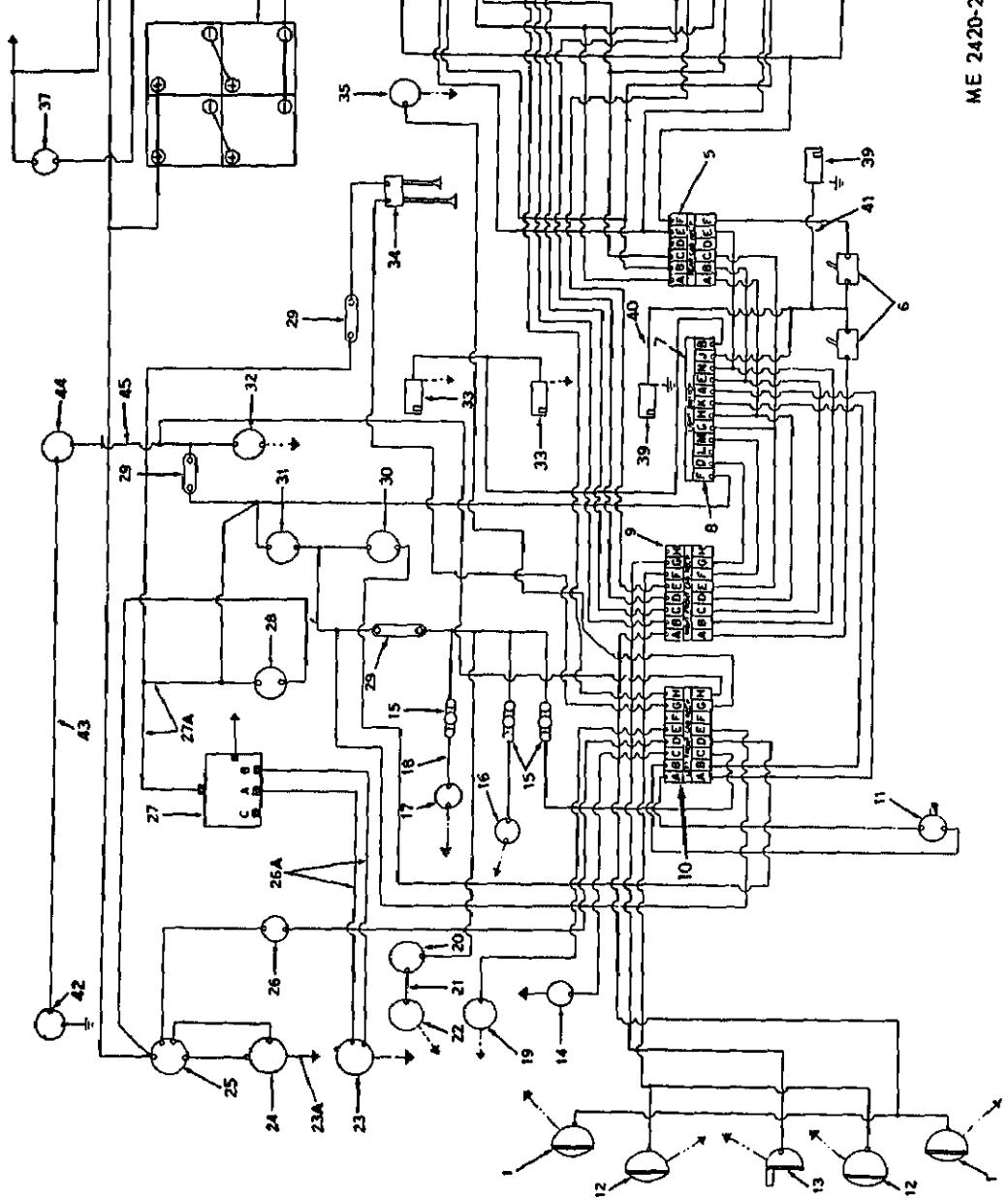
BUDDOZER

SHIPPING DIMENSIONS

OVERALL LENGTH	320 IN.
OVERALL HEIGHT	142 IN.
OVERALL WIDTH	136 IN.
WEIGHT (TANKS EMPTY)	54,190 LBS
WEIGHT (TANKS FULL)	55,627 LBS
TCNAGE	27 TONS
VOLUME	134.4 YDS

ME 2420-206-12-1

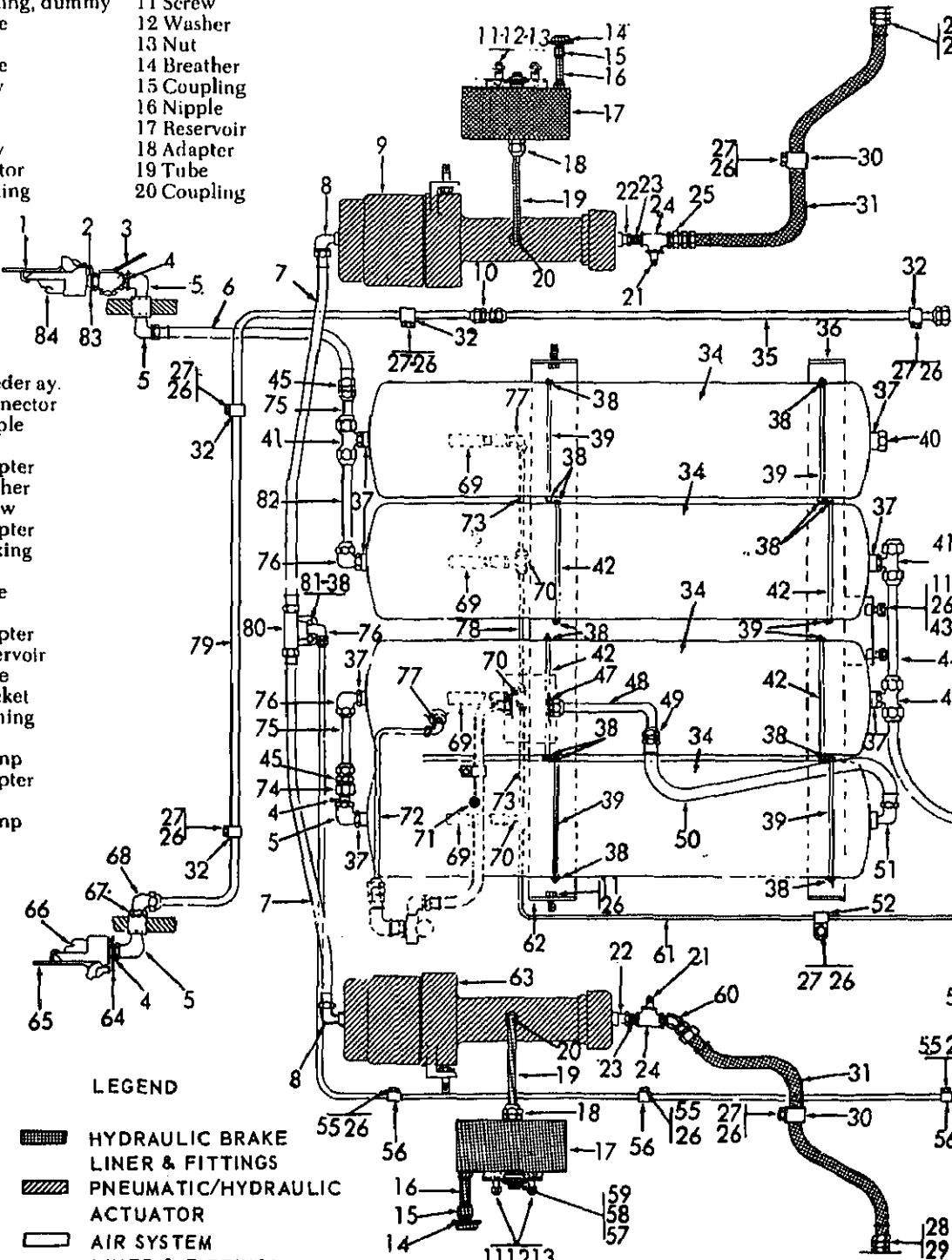




- 1 Lamp assembly
- 2 Tail and stop light
- 3 Lamp assembly
- 4 Trailer receptacle
- 5 Rear cab harness
- 6 Toggle switch
- 7 Light switch
- 8 Front cab harness
- 9 Main harness
- 10 Wiring harness
- 11 Stop light switch
- 12 Head lamp assembly
- 13 Blackout light assembly
- 14 Temperature switch
- 15 Indicator lamp
- 17 Pressure switch
- 18 Wiring harness
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- 20 Low air pressure warning switch
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- 27A Regulator-to-ammeter harness
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- 29 Circuit breaker
- 30 Starter switch
- 31 Selector switch
- 32 Utility outlet
- 33 Panel lamp
- 34 Horn
- 35 Horn button assembly
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- 40 Dash lamp cable
- 41 Dash lamp cable
- 42 Overspeed governor
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- 45 Horn to circuit breaker wire

1 Coupling, dummy
 2 Nipple
 3 Cock
 4 Nipple
 5 Elbow
 6 Hose
 7 Hose
 8 Elbow
 9 Actuator
 10 Coupling
 11 Screw
 12 Washer
 13 Nut
 14 Breather
 15 Coupling
 16 Nipple
 17 Reservoir
 18 Adapter
 19 Tube
 20 Coupling

21 Bleeder ay.
 22 Connector
 23 Nipple
 24 Tee
 25 Adapter
 26 Washer
 27 Screw
 28 Adapter
 29 Packing
 30 Clip
 31 Hose
 32 Clip
 33 Adapter
 34 Reservoir
 35 Tube
 36 Bracket
 37 Bushing
 38 Nut
 39 Clamp
 40 Adapter
 41 Tee
 42 Clamp



43 Washer

44 Tube

45 Adapter

46 Tube

47 Adapter

48 Tee

55 Screw

56 Clip

57 Cap

58 Nut

59 Screw

60 Elbow

67 Bushing

68 Elbow

69 Valve

70 Tee

71 Valve

72 Tube

79 Tube

80 Valve

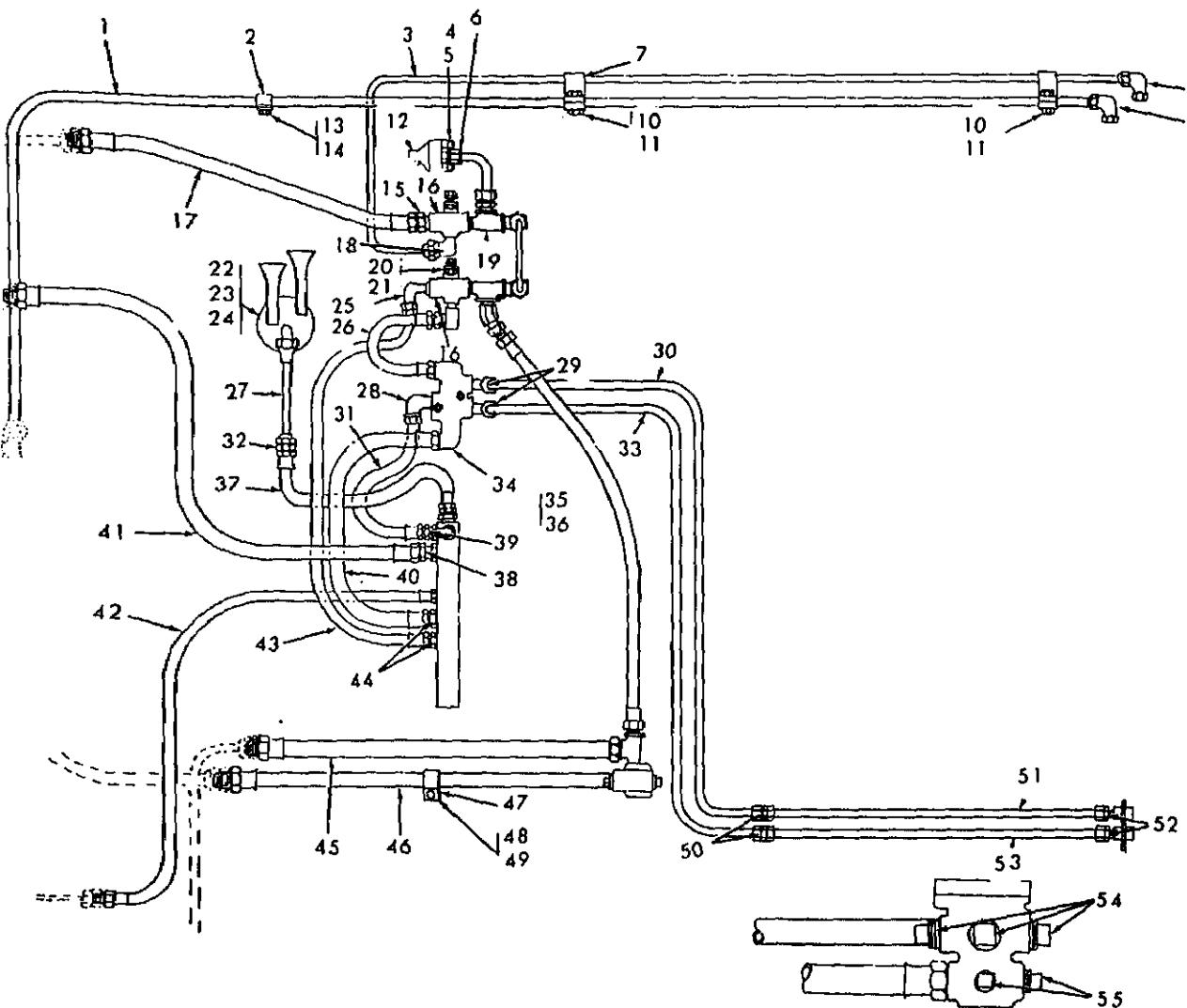
81 Screw

82 Tube

83 Tag

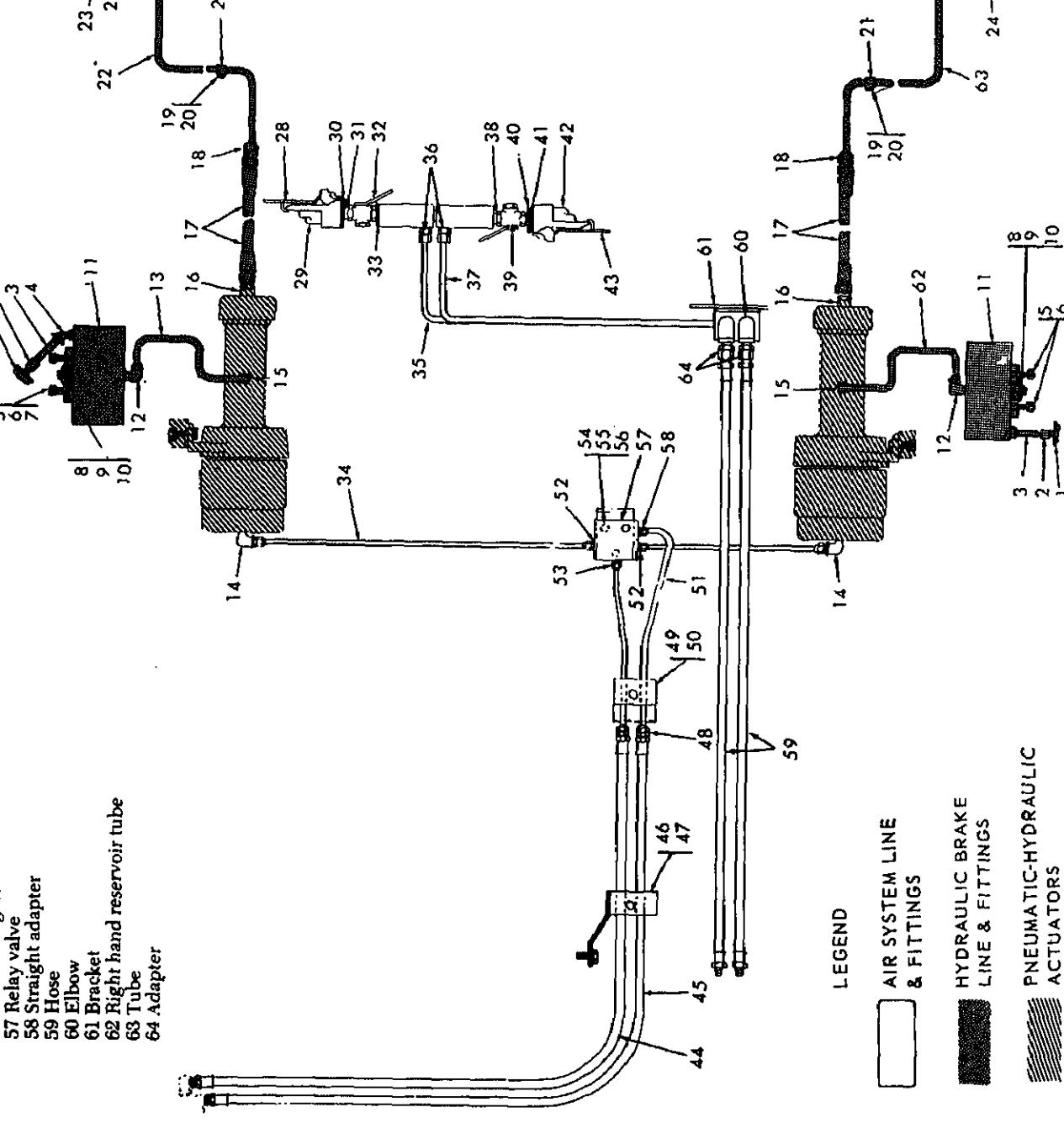
84 Coupling

ME 2420-20



ME 2420-206-12/1-4 (2)

1 Tube	21 Self-locking nut	41 Elbow
2 Clip	22 Capscrew	42 Hose
3 Tube	23 Self-locking nut	43 Hose
4 Capscrew	24 Horn	44 Hose
5 Self-locking nut	25 Pipe elbow	45 Hose
6 Connector	26 Capscrew	46 Straight adapter
7 Clip	27 Self-locking nut	47 Hose
8 Elbow	28 Hose	48 Hose
9 Elbow	29 Tube	49 Clip
10 Capscrew	30 Pipe elbow	50 Capscrew
11 Lockwasher	31 Pipe elbow	51 Self-locking nut
12 Stoplight switch	32 Tube	52 Connector
13 Lockwasher	33 Hose	53 Tube
14 Capscrew	34 Straight adapter	54 Elbow
15 Pipe bushing	35 Hose	55 Tube
16 Check valve	36 Valve	
17 Hose	37 Reducer bushing	
18 Elbow	38 Adapter	

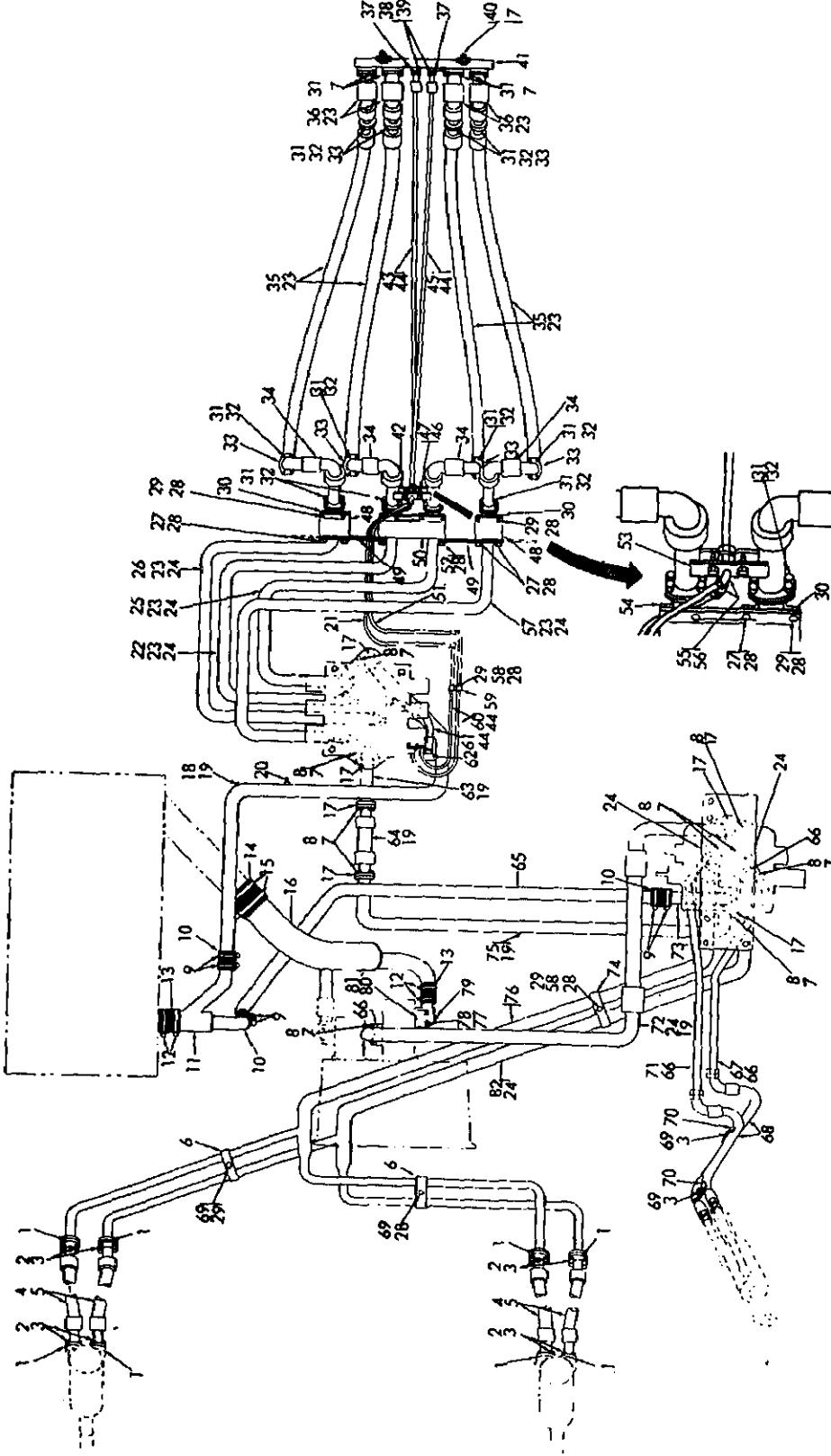


LEGEND

AIR SYSTEM LINE
& FITTINGS

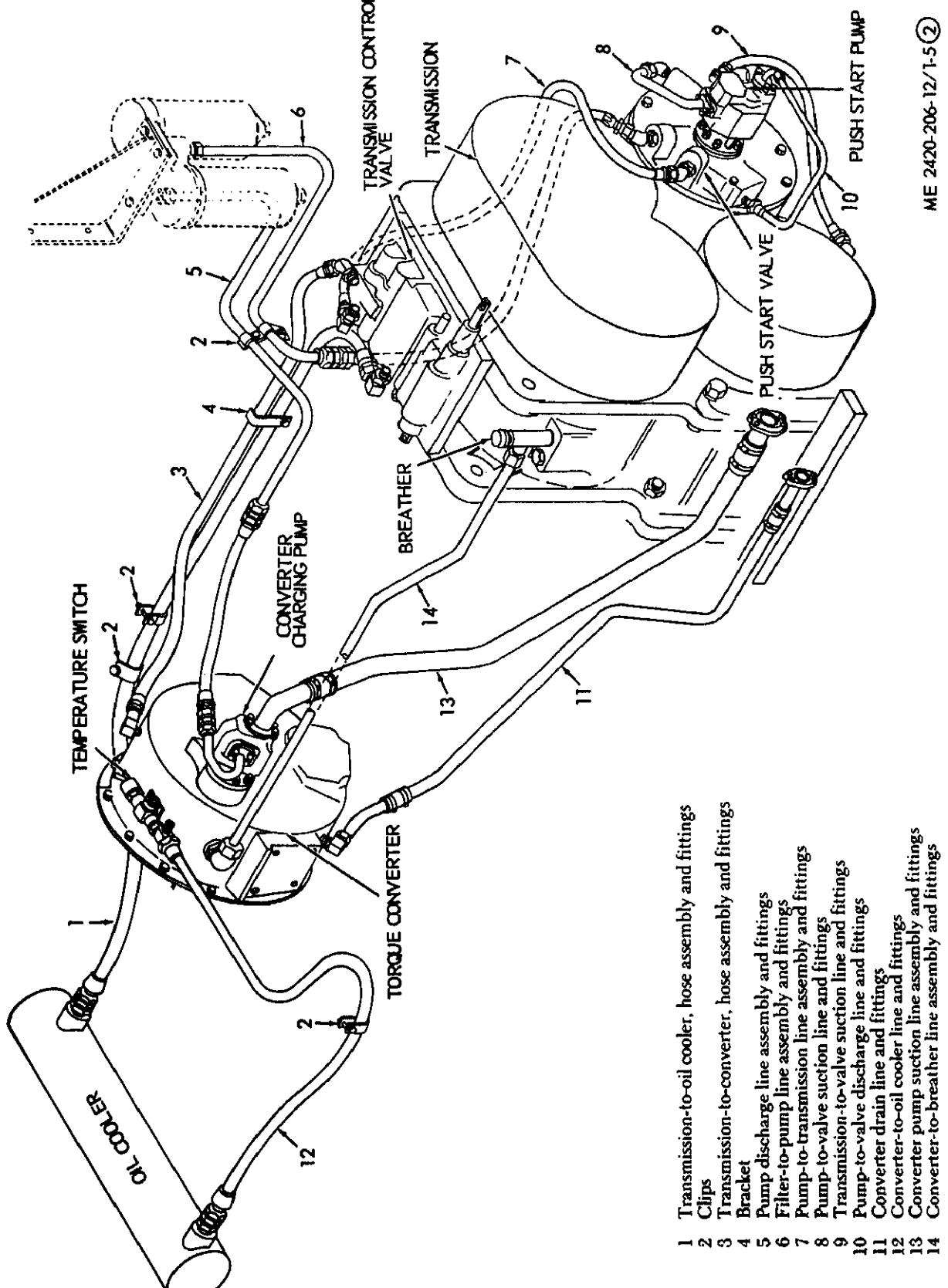
HYDRAULIC BRAKE
LINE & FITTINGS

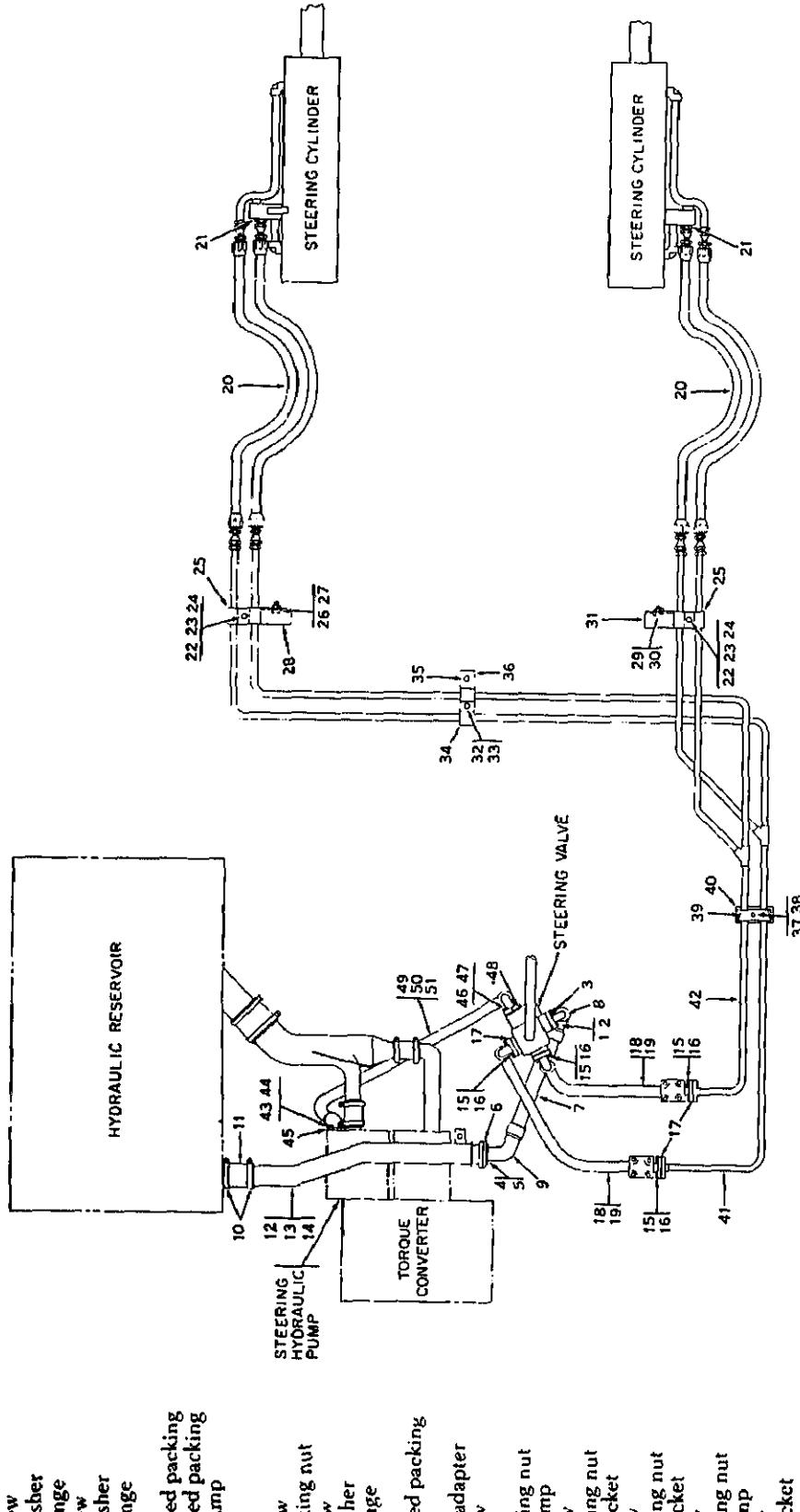
PNEUMATIC/HYDRAULIC
ACTUATORS



ME 2420-2006-12-1-5

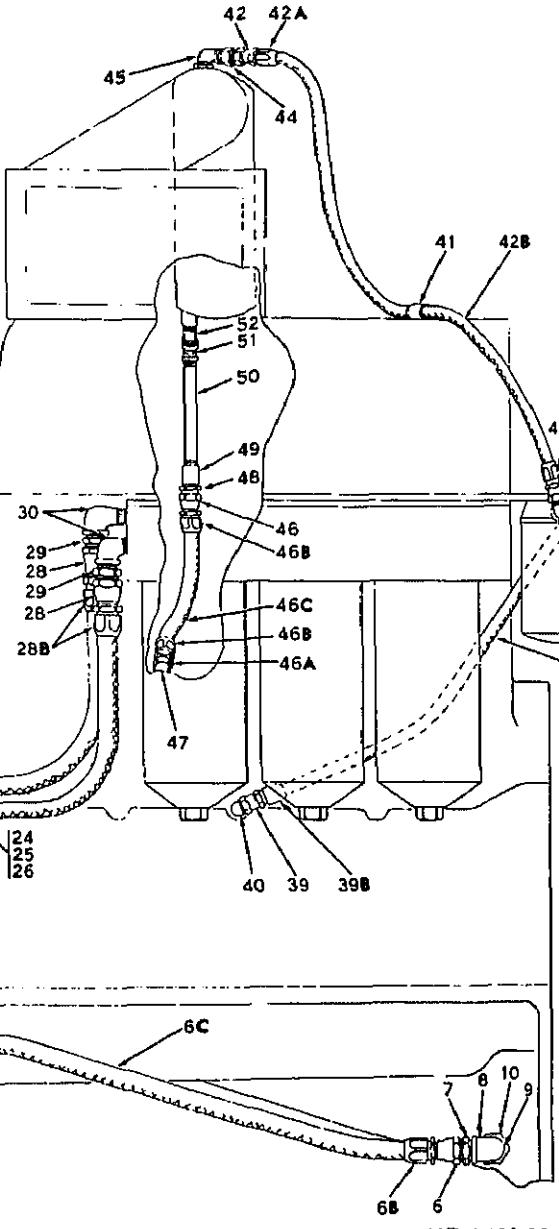
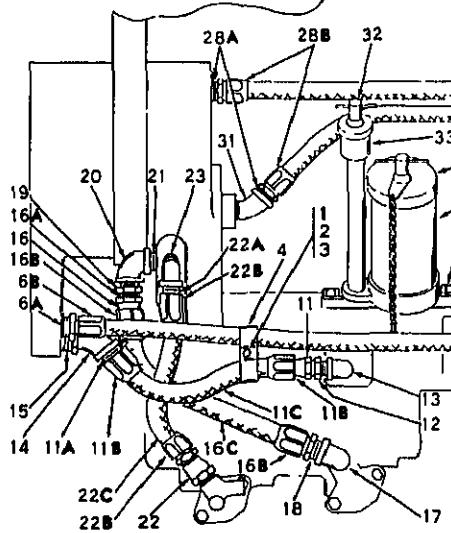
53 Plate
54 Clip
55 Elbow
56 Nut
57 Tube
58 Washer
59 Clip
60 Tube
61 Hose
62 Elbow
63 Tube
64 Hose
65 Flange
66 Tube
67 Tube
68 Hose
69 Screw
70 Clip
71 Tube
72 Hose
73 Tube
74 Clamp
75 Tube
76 Tube
77 Washer
78 Screw
79 Plug
80 Packing
81 Adapter
82 Adapter





ME 2420-2006-12/1-6

1 Screw
 2 Lockwasher
 3 Nut
 4 Clamp
 5 Clamp
 6 Swivel
 6A Nipple
 6B Socket
 6C Hose
 7 Adapter
 8 Elbow
 9 Nipple
 10 Bushing
 11 Swivel
 11A Nipple
 11B Socket
 11C Hose
 12 Adapter
 13 Elbow
 14 Elbow
 15 Connection
 16 Swivel
 16A Nipple
 16B Socket
 16C Hose
 17 Elbow
 18 Nipple
 19 Adapter
 20 Elbow



ME 2420-206

21 Nipple
 22 Swivel
 22A Nipple
 22B Socket
 22C Hose
 23 Elbow
 24 Screw
 25 Lockwasher
 26 Nut

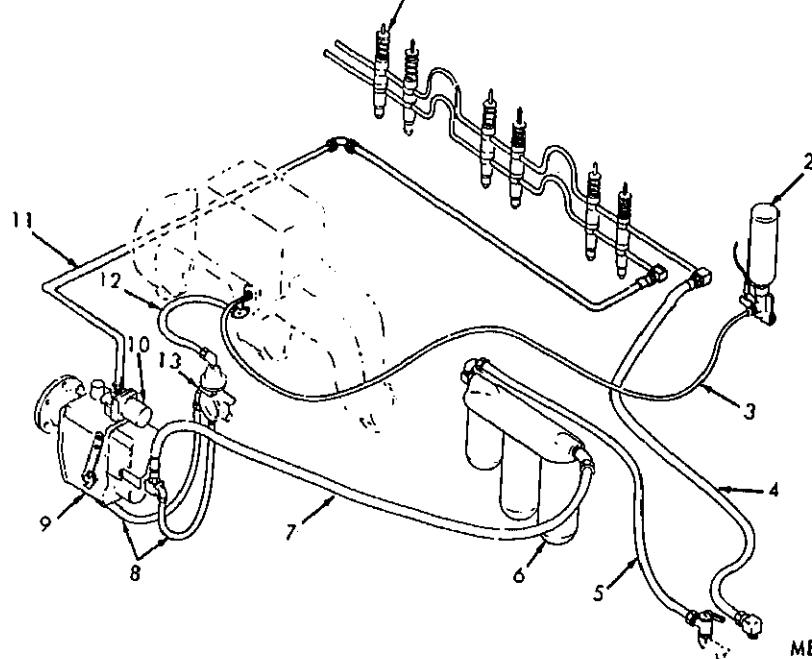
27 Clamp
 28 Swivel
 28A Nipple
 28B Socket
 28C Hose
 29 Adapter
 30 Elbow
 31 Elbow
 32 Dipstick tube
 33 Dipstick

34 Filler cap
 35 Capscrew
 36 Lockwasher
 37 Bracket
 37A Filler tube
 38 Gasket
 39 Swivel
 39A Nipple
 39B Socket
 39C Hose

40 Elbow
 41 Hose clip
 42 Swivel
 42A Socket
 42B Hose
 43 Elbow
 44 Connector
 45 Elbow
 46 Swivel
 46A Nipple

46B Socket
 46C Hose
 47 Elbow
 48 Adapter
 49 Coupling
 50 Pipe
 51 Elbow
 52 Pipe

Figure 1-7. Engine oil lines and fittings.



ME 2420-206-12

- 1 Injector
- 2 Ether starting aid
- 3 Tube
- 4 Hose
- 5 Hose
- 6 Filters
- 7 Hose
- 8 Hose
- 9 Fuel pump
- 10 Fuel shutoff solenoid
- 11 Tube
- 12 Hose
- 13 Aneroid

Figure 1-8. Fuel lines and fittings.

1-4. Identification and Tabulated Data

a. *Identification.* The tractor has seven identification plates.

(1) *U. S. Army plate.* Located in cab to right of instrument panel, specifies tractor and engine manufacturer, models, serial numbers, FSN and contract number.

(2) *Transportation data plate.* Located in cab to right of the instrument panel, specifies center of gravity and tonnage for lifting with cables.

(3) *Tractor lubrication plate.* Located next to transportation plate.

(4) *Engine plate.* Located on left front side of engine. Specifies manufacturer, model, size, and serial number.

(5) *Generator plate.* Located on generator. Specifies voltage, amperes and manufacturer.

(6) *Starter plate.* Located on starter. Specifies voltage, amperes and manufacturer.

(7) *U. S. Corp of Engineers plate.* Located on scarifier assembly. Specifies model, size and manufacturer.

b. Tabulated Data.

(1) Tractor.

Manufacturer Clark
Model 290M

(2) Engine.

Type Diesel
Manufacturer Cummins
Model No. NT380
Rotation, viewed from fan Right hand
Rated brake horsepower 350
At governed speed 2000 rpm (sea level)
Low idle speed 700 rpm
Number of cylinders 6
Firing order 1-5-3-6-2-4
Bore dia. 5 1/2 inches
Stroke 6 inches
Engine aspiration Turbocharged

(3) Engine accessories.

(a) Generator.

Manufacturer Delco-Remy
Part No. 1117478
Rating 24 volts

(b) Generator regulator.

Manufacturer Delco-Remy
Part No. 1118558
Rating 24 volts

(c) Starter.

Manufacturer Delco-Remy
Part No. 1113868
Rating 24 volts

(d) Air compressor.

Manufacturer Cummins

Manufacturer Farr
Part No. B24059
Type Dual element

(g) Turbocharger.

Manufacturer Cummins
Model No. T-590

(4) Drive systems.

(a) Torque converter.

Manufacturer Clark
Model No. C-8602-2

(b) Transmission.

Manufacturer Clark
Model No. 8420-4
Type Power shift
Speeds Four forward, two reverse
Output shafts 2

(c) Axles.

Manufacturer Clark
Model Nos.
Front 131518
Rear 131519

(5) Hydraulic system.

(a) Hydraulic pump.

Manufacturer Vickers
Model No. 45V57A-19D10A-
Type Vane

(b) Bulldozer control valve.

Manufacturer Parker-Hannifin
Model No. VDSP26DF23

(c) Main control valve.

Manufacturer Caterpillar Tractor
Part No. 4J9323

(6) Steering system.

(a) Steering gears.

Manufacturer Saginaw
Part No. 5693792

(b) Hydraulic pump.

Manufacturer Vickers
Model No. 45V47A-19B10A-
Type Vane

(7) Brake system.

(a) Brake actuators.

Manufacturer Goodrich
Model No. 228-1

(b) Wheel brakes.

Manufacturer Goodrich
Model No. 2-968

(c) Brake treadle valve.

Manufacturer Bendix-Westinghouse
Model No. 279076

(d) Relay valve.

Manufacturer Bendix-Westinghouse
Model No. R-5

(8) Tires.

Size 29.5 x 29-28 ply
Pressure 45 psi

Planetary gears, front and rear (4 each)	13 qts GO each
Aneroid control	2 oz
Brake reservoirs, each	2 qts
Hydraulic system	125 gal

(10) Adjustments.

Engine valve adjustment:	
Intake valves cold	0.016 inch
Intake valves hot	0.014 inch
Exhaust valves cold	0.029 inch
Exhaust valves hot	0.027 inch
Engine injector adjustment:	
Cold setting	.48 in. lb.
Hot setting	.60 in. lb.

(11) Scarifier (backripper).

Manufacturer	Renner Mfg. Co.
Type	1
Size	4
Bulldozer lift cylinder cap screws	.50 ft. lb.

(a) Tractor.

Height	144 in. (inch)
Length	320 in.
Width	136 in.
Weight	54,190 lbs. (pounds)
Tons	27
Volume	134.4 yd. (yard)

(b) Scraper.

Length	320 in.
Weight (empty)	31,860 lbs.
Capacity (load struck)	18.9 cu. yd. (cubic yd.)

(c) Bridge weights.

Tractor with tanks filled	28 tons
Tractor and scraper with pay load	70 tons
Tractor with scraper, empty	44 tons

(13) General Torque specification-bolts and screws. See table 1-1.

Table 1-1. General Torque Specifications — Bolts and Screws

(All torque values are given in pound feet)

Size	Threads per inch	Standard heat-treated bolts and screws	Special heat-treated bolts, screws, Allen-head screws, and self-locking capscrews
1/4	20	6-8	9-11
	28	8-10	10-12
5/16	18	15-18	17-20
	24	17-20	19-23
3/8	16	26-32	36-43
	24	33-40	41-49
7/16	14	42-50	54-65
	20	50-60	64-77
1/2	13	67-80	81-97
	20	83-100	96-115
9/16	12	85-100	103-123
	18	100-120	122-146
5/8	11	117-140	164-192
	18	134-160	193-225
3/4	10	180-210	284-325
	16	215-250	337-385
7/8	9	315-360	490-550
	14	372-425	575-650
1	8	445-500	685-770
	14	535-600	830-925

Section I. SERVICE UPON RECEIPT OF MATERIEL

1. Inspecting and Servicing Equipment

Note. Make sure equipment is deprocessed before servicing. Make sure preservatives have been removed from such items as crankcase, tanks, gear boxes, wet clutches, and the like. Refer to DA Form 2258 attached in operator's cab.

a. Perform preventive maintenance checks and services, paragraph 3-13.

b. Inspect to see that the required tools, repair parts, publications, accessories and attachments are with the tractor.

c. Inspect tractor for loss of parts or damage which may have occurred during loading, unloading or shipment.

d. Report all damage and deficiencies that cannot be corrected by organizational maintenance to tact support maintenance.

2. Installation of Separately Packed Items

a. Refer to figure 2-1 and install batteries. Refer to wiring diagram (fig. 1-3) for proper cable connection. Fill batteries with electrolyte 3/8 inch above plates.

Caution: Do not splash or spill electrolyte on flesh, clothing or equipment.

b. Install seat cushions, safety belts, lever knobs, side rear view mirrors and fire extinguisher.

c. When extreme cold weather, 32°F., 0 C., is expected, prepare tractor engine coolant system in accordance to instructions in TB-ORD-651.

Note. A water corrosion resister used in coolant system will be by-passed or element shall be removed before adding inhibited antifreeze in coolant system.

d. In freezing temperature run engine for one hour after adding water to batteries.

3. Installation or Setting Up Instructions

a. After performing lubrication, preventive maintenance checks and services and removal of tractor shipping lock links, wedges and braces, the tractor is operationally ready and able to move under its own power.

b. Refer to figure 2-2 and remove shipping lock link and wedge. Stow in tool box.

c. Refer to figure 2-3 and remove tractor universal coupler brace.

d. Refer to figure 2-4 and remove bulldozer lock link.

2-4. Equipment Conversion

a. *General.* The tractor is equipped for operating a material scraper attached to the universal coupler, figure 2-5. Refer to applicable scraper technical manual when securing scraper mounting plate to tractor universal coupler.

b. Scraper Operation.

(1) Loading bowl.

(a) Move bowl and apron levers (fig. 2-6) to hold, then fully raise bowl and apron, then to hold, move ejector lever to fully lower ejector, then to hold.

(b) Move tractor transmission lever to a forward position while equipment is moving, move bowl lever to lower (slowly) to depth of material to be removed at one time, then move to hold. At filling bowl or end of material area is reached, move apron lever to lower at the same time move bowl lever to raise, then move both levers to hold.

Caution: During operation of equipment, check and remove large objects that may cause damage to equipment if operation is continued.

(2) Move loaded bowl.

(a) Move all scraper control levers to hold.

(b) Move tractor transmission lever to high speed position and move equipment to unload (dumping) area.

Note. When observation reveals that loaded scraper is not trailing properly during equipment movement at high speed, stop operation and correct irregularities. Refer to applicable scraper TM.

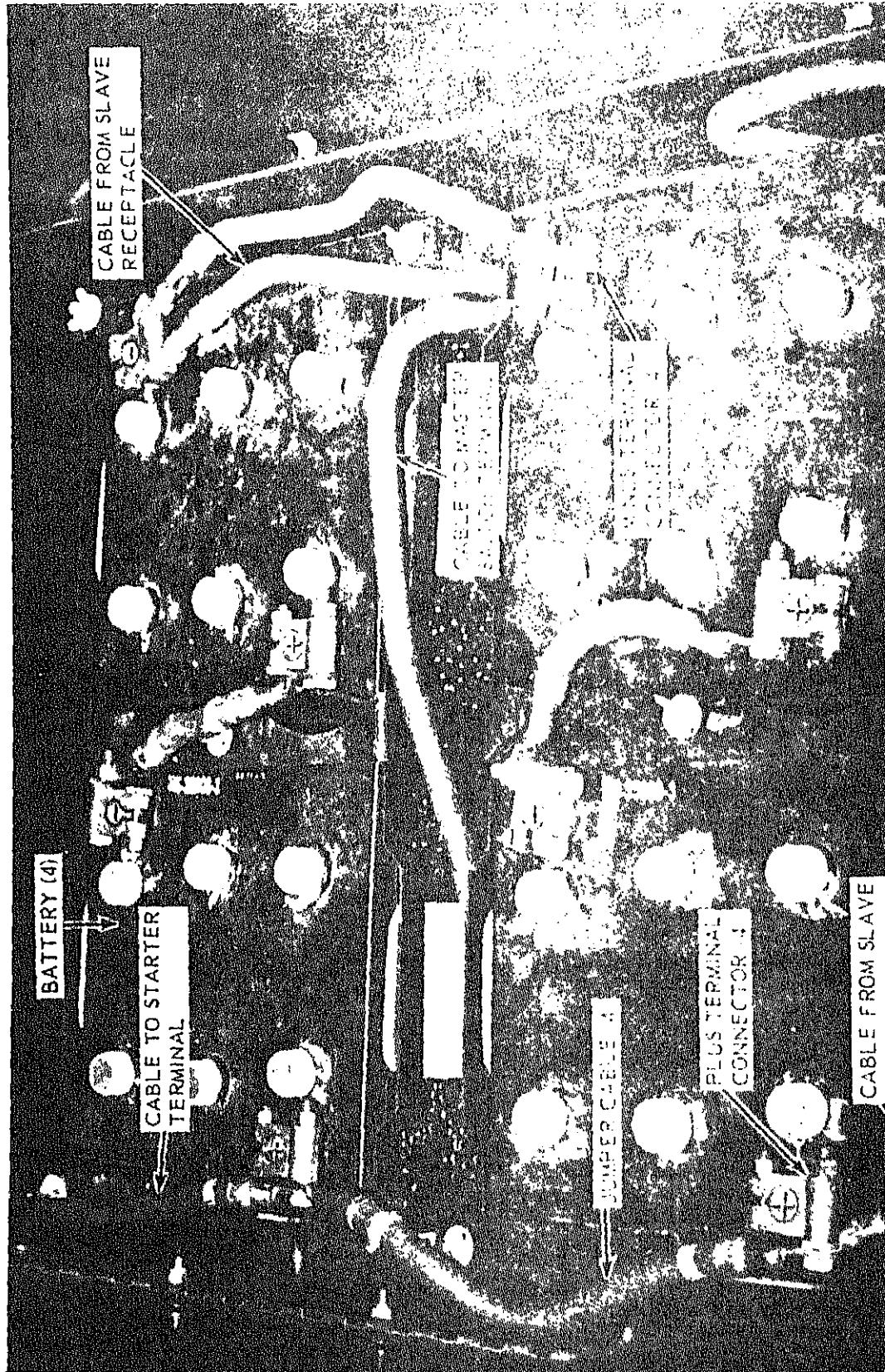
(c) After reaching area for unloading (dumping) material, position tractor transmission lever to low forward speed.

(3) Unloading scraper (dumping, spreading).

(a) Move apron lever to raise position, then to hold.

(b) Lower scraper bowl to desired height (up to 8 inches), move ejector lever to eject, then to hold.

(c) When unloading is completed move ejector lever to return, then hold and move bowl lever to raise, then hold, and apron lever to lower, then hold for return trip to loading area. The operator may vary lever positions during dumping and even spreading of the load.



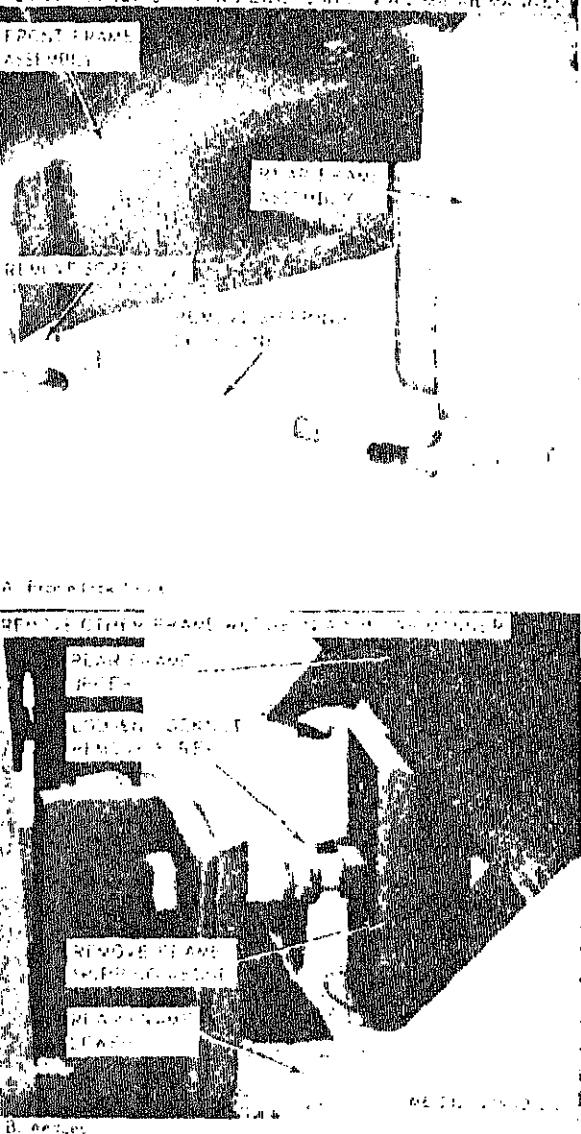


Figure 2-2. Shipping lock link and wedge, removal and installation.

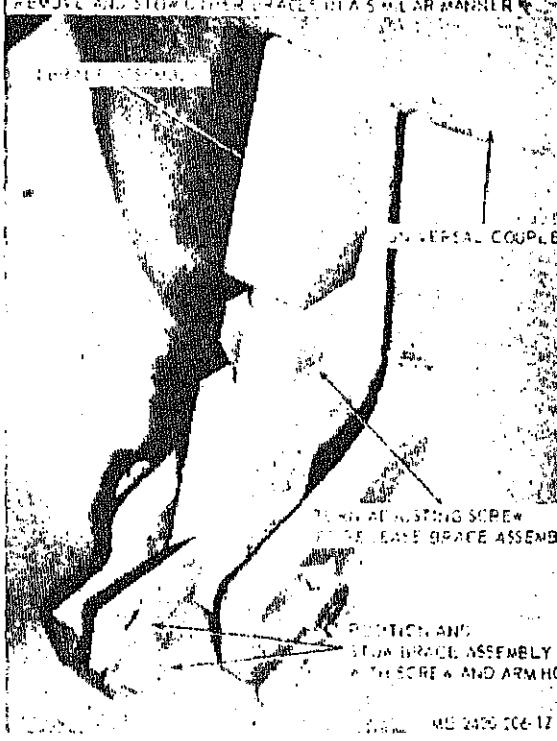


Figure 2-3. Tractor universal coupler brace, removal and stowage.

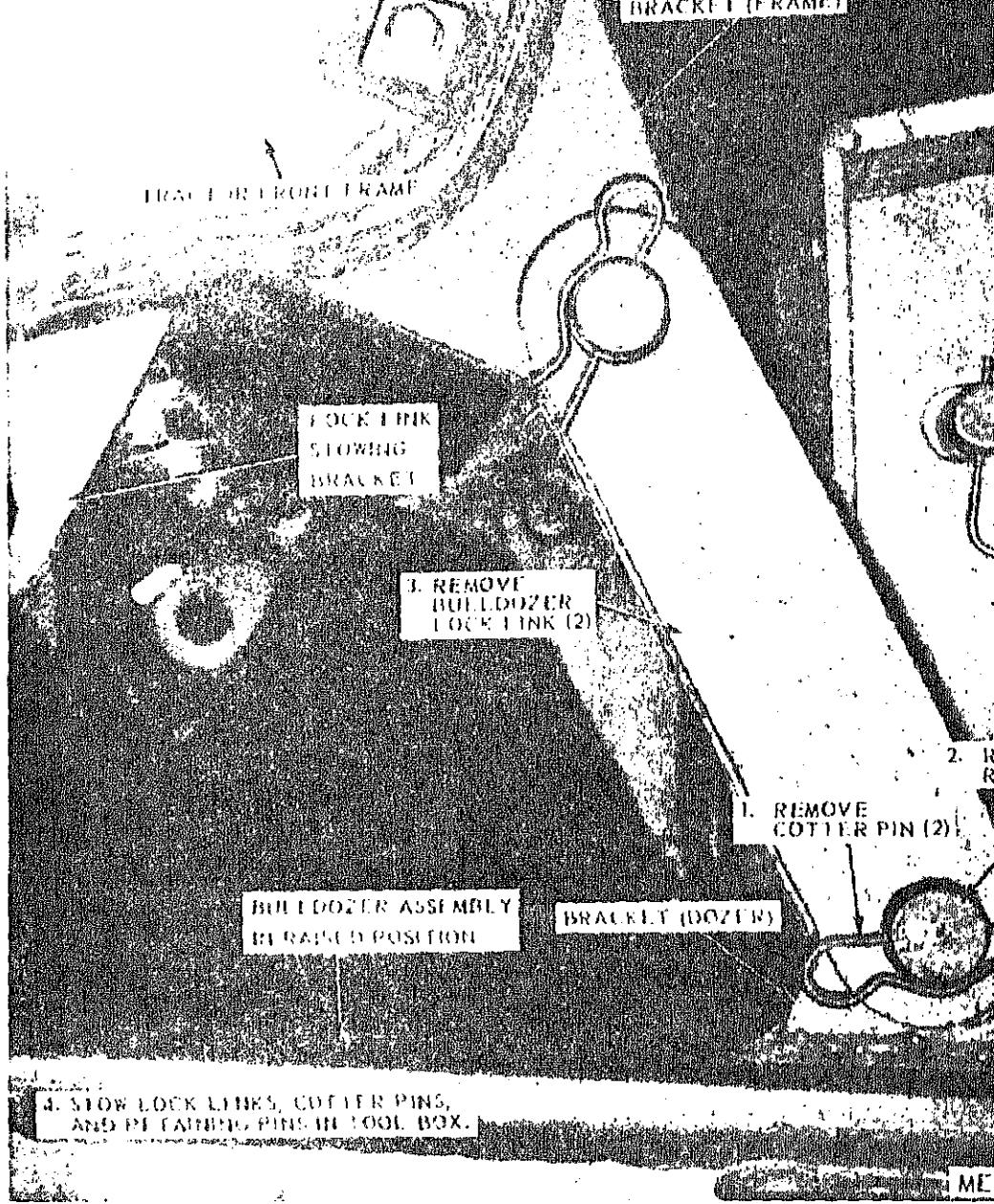
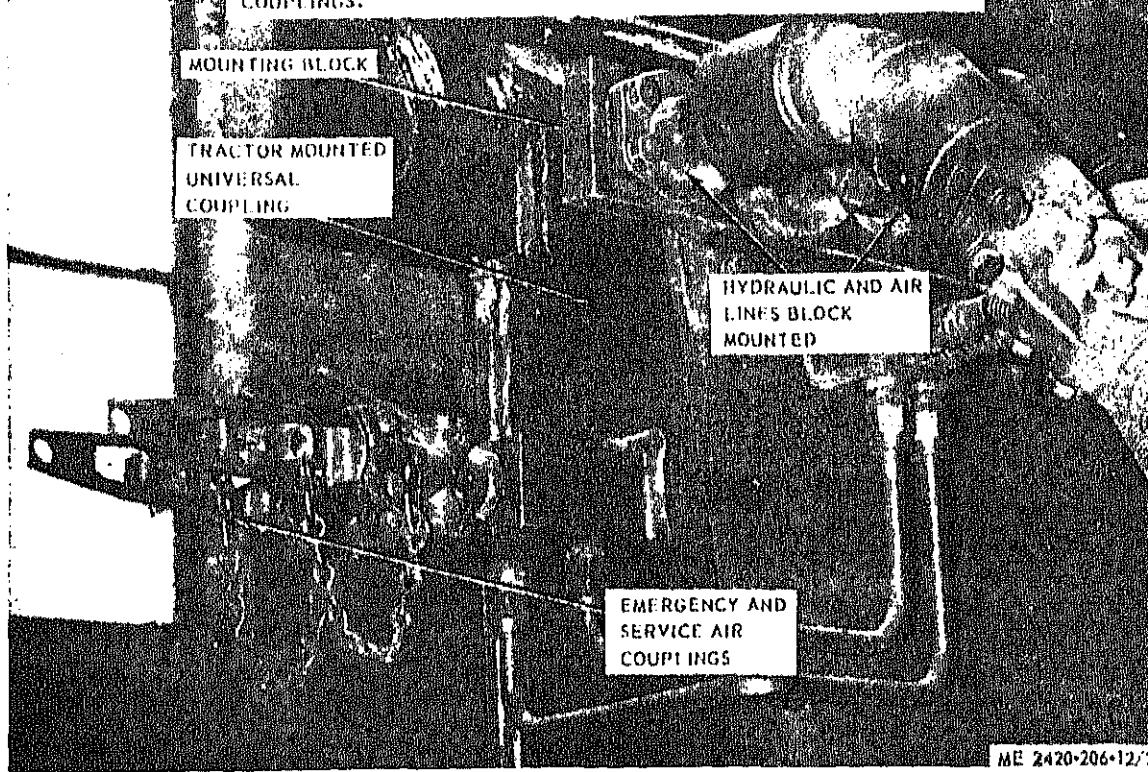
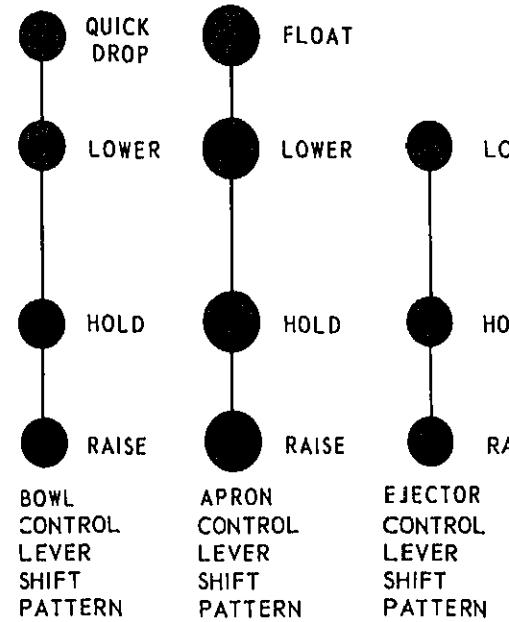
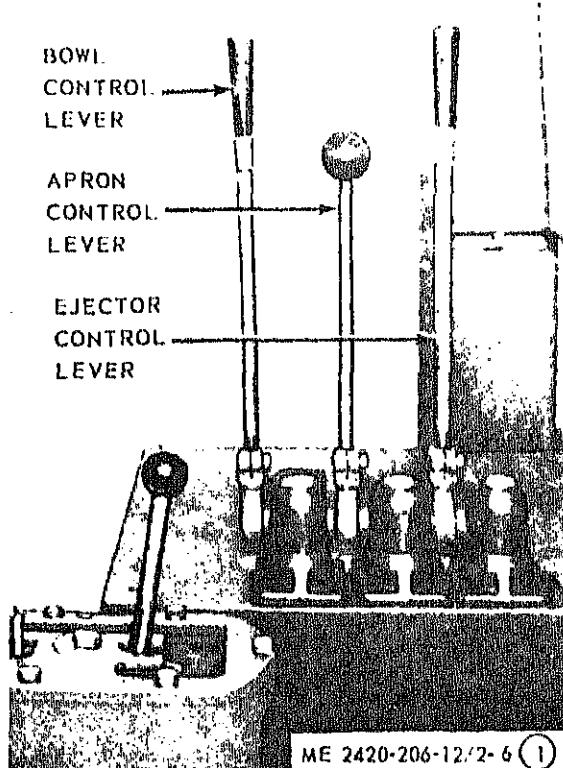


Figure 2-4. Bulldozer lock link, removal and installation.



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Figure 2-5. Tractor universal coupler, hoses and lines.



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ME 2420-206-12/2

2-5. Dismantling for Movement

- a.* Dismantling tractor is not required for short-distance moves to a new worksite. Before crossing bridges with equipment, check bridge load tonnage. Refer to equipment tonnage, paragraph 1-4.
- b.* For movement to a new worksite within zone

of interior, prepare tractor as outlined in 2-1.

2-6. Reinstallation After Movement

Refer to paragraph 2-3 and service tract movement to a worksite within zone of the

Section III. CONTROLS AND INSTRUMENTS

2-7. General

This section describes various controls and instruments and provides the operator/crew sufficient information to insure proper operation of the tractor and towed equipment (when attached).

2-8. Controls and Instruments

The purpose of controls and instrument normal and maximum reading of gages trated in figure 2-7. Should abnormal occur, shut off engine immediately.

ENGINE OIL PRESSURE GAGE
NORMAL READING AT OPERATING SPEED
35 PSI, AT IDLE SPEED 7-10 PSI MINIMUM.

WATER TEMPERATURE
GAGE-NORMAL READING
165 TO 195 F.

FLOOD LIGHT
SWITCH LEVERS
(NORMALLY OFF)

ENGINE OIL LOW PRESSURE
WARNING LIGHT, (LIGHT MAY BE
ON WHEN ENGINE IS IDLING).

PANEL
LIGHTS

SERVICE, STOP,
FLOOD, BLACK-OUT,
PANEL LIGHT, LOCK
AND UNLOCK CONTROL
LEVERS

TRANSMISSION OIL
PRESSURE GAGE
NORMAL READING
180 TO 300 PSI

TRANSMISSION OIL
LOW PRESSURE WARNING
LIGHT

CONVERTER OIL TEMPERATURE GAGE
NORMAL READING IS LESS THAN 250°F
(IF TEMPERATURE EXCEEDS 250°F
DOWNSHIFT TO LOWER SPEED, TO
PREVENT EXCESSIVE HEATING).

AIR
CLEANER
GAGE

CONVERTER
HIGH TEMPER-
WARNING LIG-
(WHEN LIT
DOWNSHIFT T
LOWER SPEED
PREVENT
EXCESSIVE
HEATING).

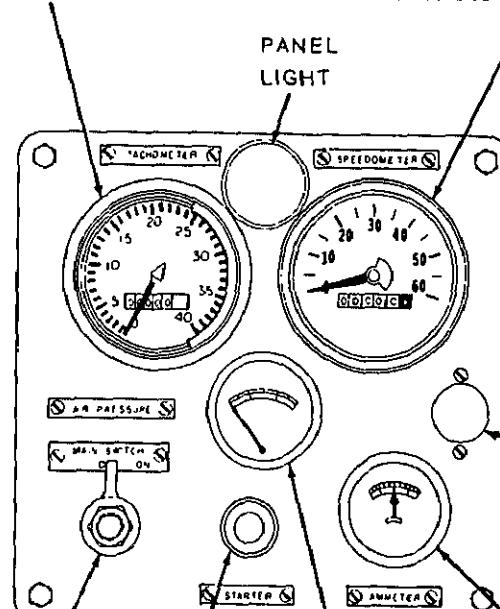
TROUBLE
LIGHT
SOCKET

Figure 2-7. Controls and Instruments (sheet 1 of 6).

ME 2420-206-12

TACHOMETER-REGISTERS
ENGINE SPEED RPM AND
TOTAL HOURS OF OPERATION

SPEEDOMETER
INDICATES TRACTOR SPEED
IN MILES PER HOUR AND
TOTAL MILES TRAVELED



MAIN SWITCH LEVER-
WHEN MOVED TO ON,
CLOSES ELECTRIC
CIRCUITS TO WARNING
LIGHTS, SOUNDING
DEVICES AND CONTROLS,
GAGES AND ENGINE
CRANKING STARTER

ENGINE STARTER
(CRANKING)
PUSH BUTTON

AMMETER GAGE READING
SLIGHT CHARGE (PLUS)
DURING NORMAL ENGINE
OPERATION

AIR PRESSURE GAGE
NORMAL OPERATING
PRESSURE READING
90 TO 120 PSI

FRONT WINDSHIELD WIPER
MOTOR CONTROLS

LEFT

RIGHT



AIR RE
MOIST
DRAIN



ENGINE QU
(ETHER AID)

TRACTOR-TRAILER
OPERATING PROTECTION
CONTROL LEVER
(NORMALLY IN NORMAL
POSITION)

ME 2420-2

Figure 2-7. Controls and Instruments (sheet 2 of 6).

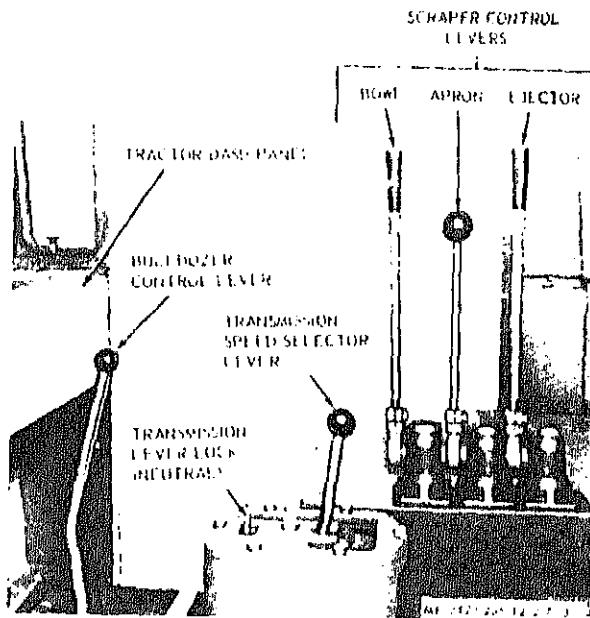
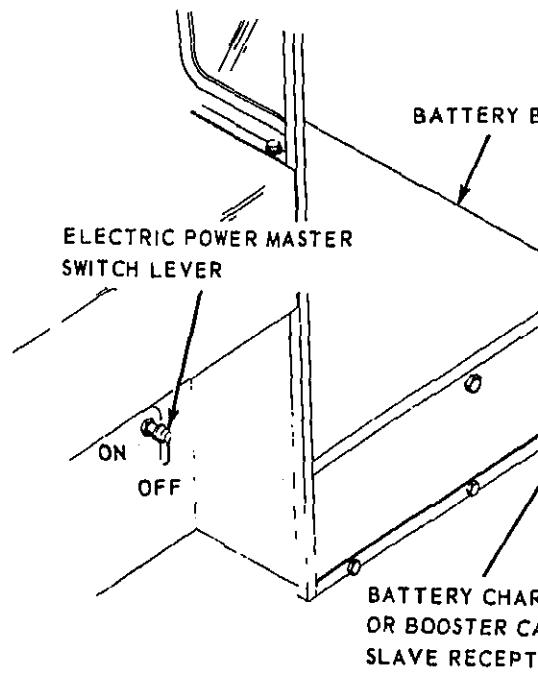
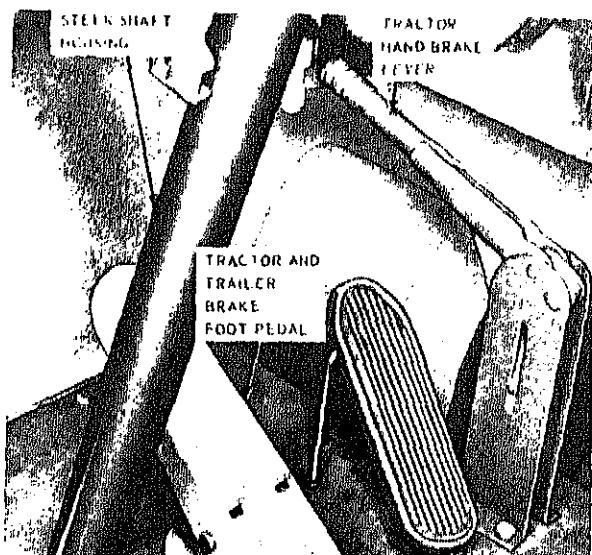


Figure 2-7. Controls and Instruments (sheet 3 of 6).



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Figure 2-7. Controls and Instruments (sheet 4 of 6)



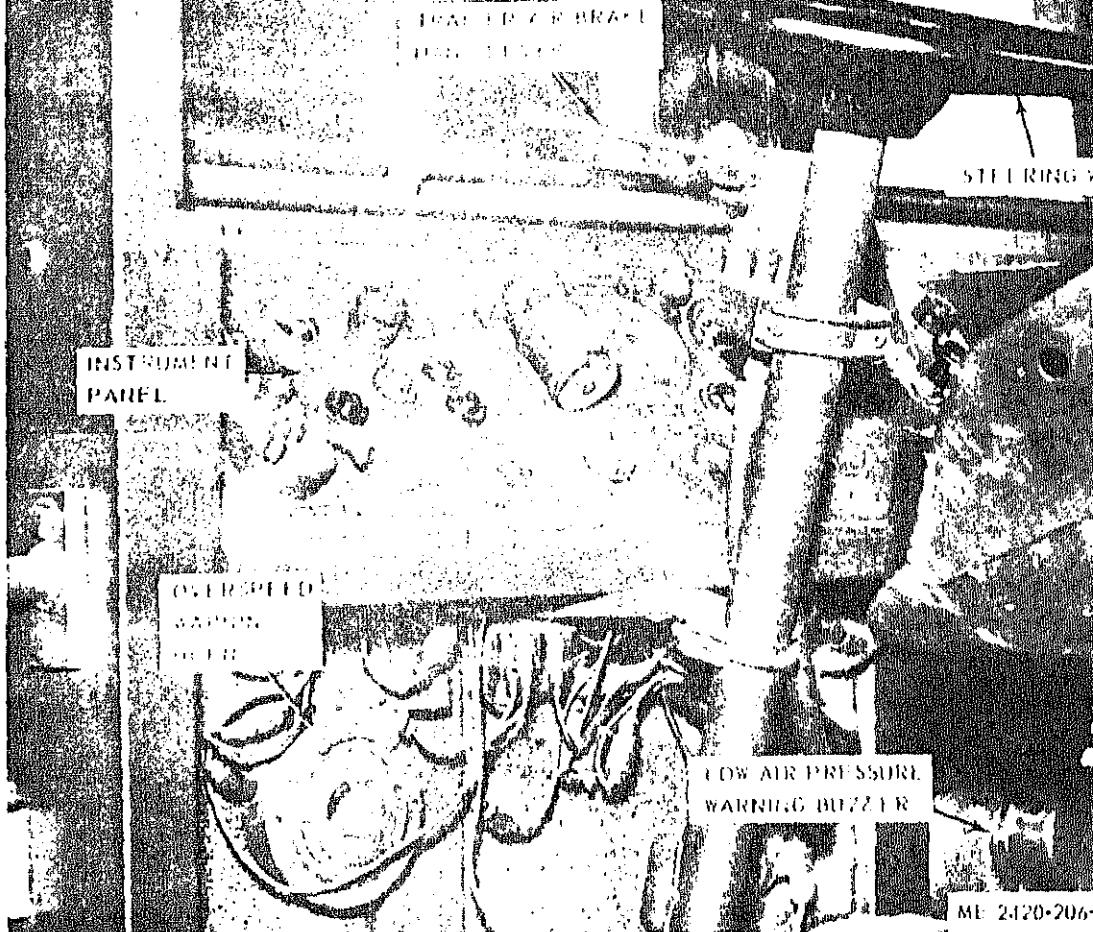


Figure 2-7. Controls and instruments (sheet 6 of 6).

Section IV. OPERATION UNDER USUAL CONDITIONS

2-9. General

a. The instructions in this section are published for the information and guidance of personnel responsible for operation of the tractor.

b. The operator must know how to perform every operation of which the tractor is capable. Instructions on starting and stopping tractor, operation of tractor, bulldozer and scraper (when towed) and on coordinating basic motions to perform various functions.

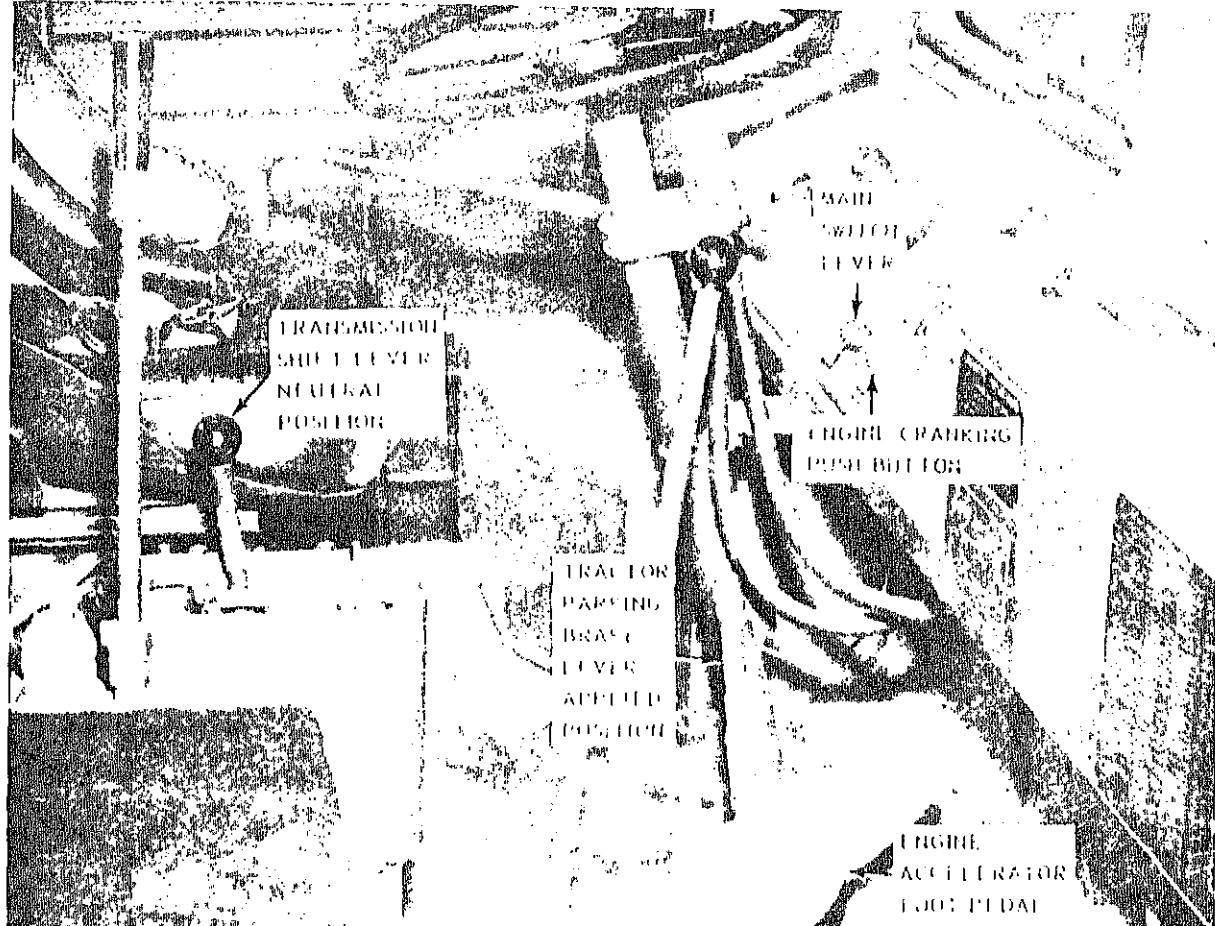
2-10. Starting

a. Preparation for Starting.

(1) Perform preventive maintenance and services, table 3-1.

(2) Lubricate as specified in section order.

b. Start tractor in numerical steps. Air pressure in air reservoir is less than air pressure warning buzzer (fig. 4).



STEP 1. SET PARKING BRAKE LEVER IN APPLIED POSITION.

STEP 2. PLACE TRANSMISSION SHIFT LEVER IN THE NEUTRAL POSITION.

STEP 3. MOVE BASTER SWITCH LEVER IN TO POSITION.

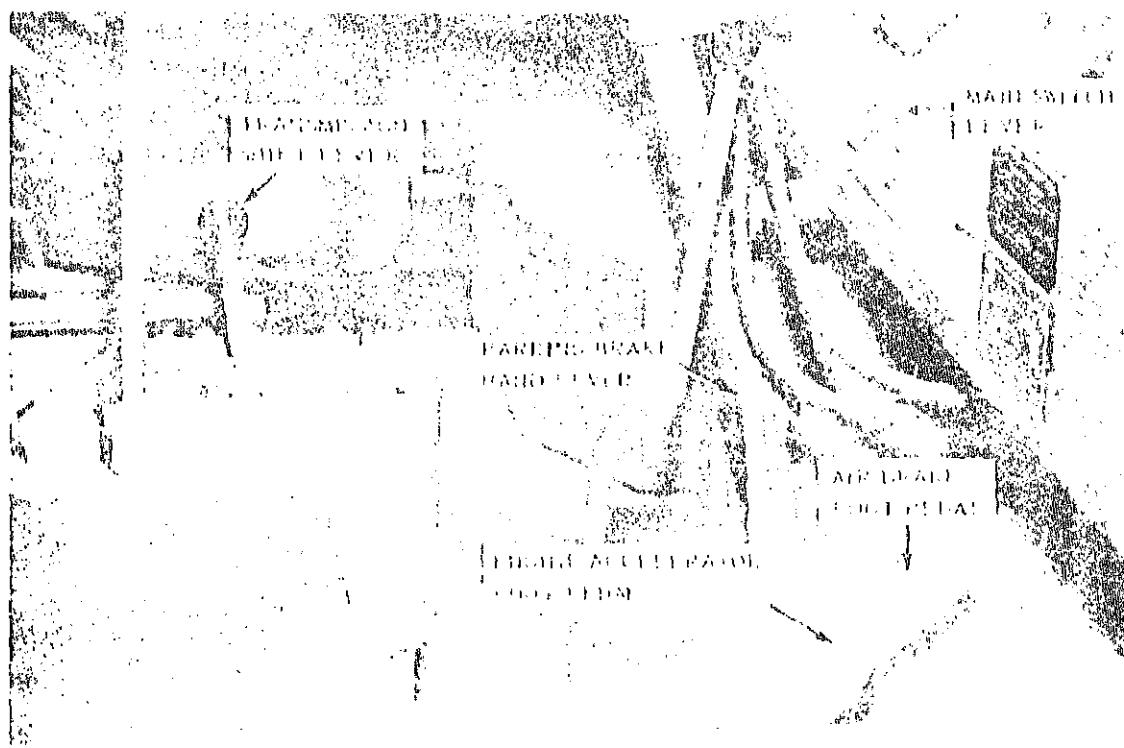
STEP 4. DEPRESS ENGINE ACCELERATOR FOOT PEDAL
HALFWAY TO FLOOR, MOVE MAIN SWITCH LEVER TO
OFF AND DEPRESS ENGINE CRANKING STARTING
PLUG BY FOOT UNTIL ENGINE STARTS.

CALUTION: DO NOT CRANK ENGINE MORE THAN
30 SECONDS CONTINUOUSLY, ALLOW 2 MINUTE
INTERVALS BETWEEN STARTING ATTEMPTS.
IF ENGINE FAILS TO START AFTER
SEVERAL ATTEMPTS, STOP CRANKING
AND DETERMINE CAUSE - CORRECT OR
REPORT CONDITION TO ENGINE SUPPORT
MANUFACTURER.

STEP 5. AFTER ENGINE STARTS ACCELERATE TO 700 RPM
UNTIL ENGINE RIPS 3000 RPM. OBSERVE GAUGES
FIG. 2-71 FOR READINGS. SLOWLY INCREASE RPM
AND CHECK GAUGES FOR NORMAL READINGS.

a. Stop tractor in numerical steps, figure 2-9.

of certain parts of the services, Table 3-1.



1. STEP 1: USE BRAKE PEDAL, ENGINE AND BRAKE ACCELERATOR.
2. STEP 2: RELEASE BRAKE PEDAL, PULL BRAKE LEVER TO THE LEFT. PULL BRAKE LEVER TO THE LEFT AND HOLD IT. TURN BRAKE ACCELERATOR IN HAVING HANDLE LEVER ON THE BRAKE ACCELERATOR.
3. STEP 3: WHEN BRAKE ACCELERATOR IS RELEASED, PULL BRAKE LEVER TO THE LEFT AND HOLD IT.
4. STEP 4: WHEN BRAKE LEVER IS RELEASED, BRAKE PEDAL.

FIG. 2-9

Figure 2-9. Tractor stopping instructions.

2-12. Operation of Equipment

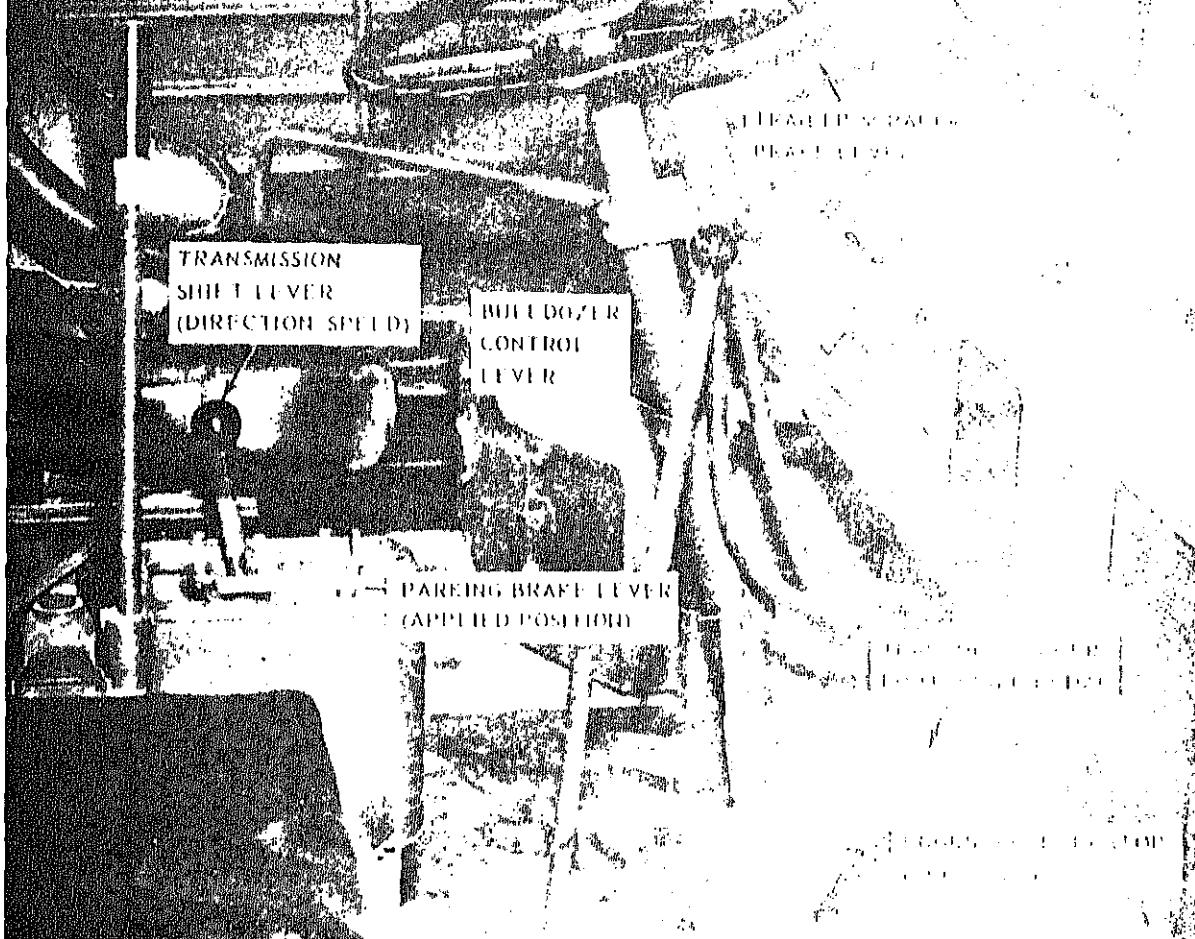
a. General. Tractor bulldozer assembly and scraper attachment is used for moving, hauling, leveling and grading of material.

b. Tractor Operation.

scraper yoke when making turns turns as tractor can be steered into causing damage to fuel or hydraulic

(2) Start tractor (para 2-10).

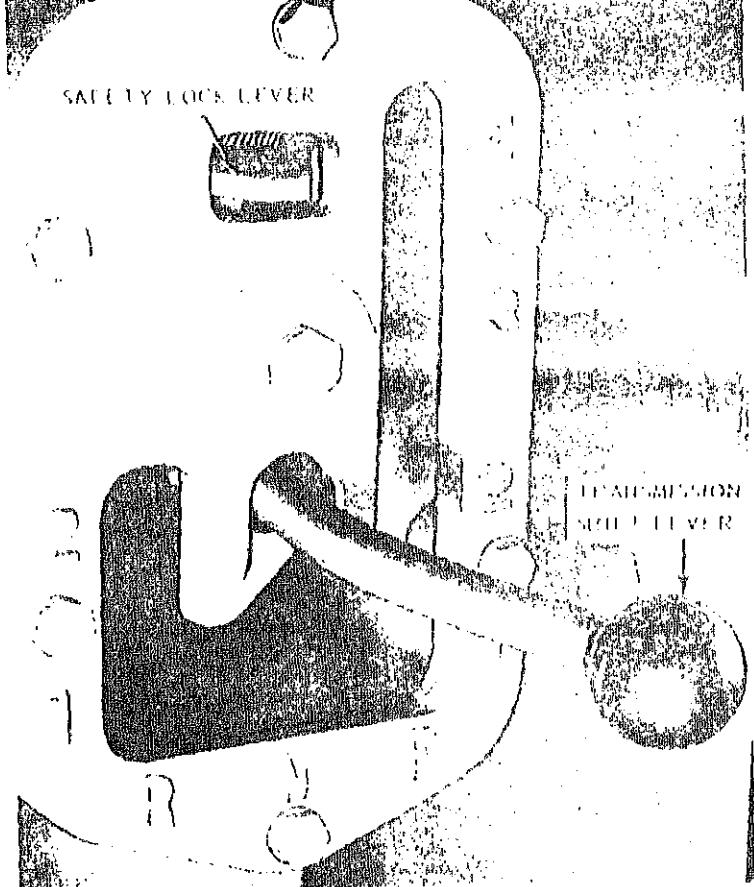
(3) Adjust operator seat and fasten



- STEP 1. START ENGINE FIGURE 2-8
- STEP 2. RAISE BULLDOZER FIGURE 2-11 (IF NECESSARY)
- STEP 3. MOVE PARKING BRAKE LEVER FORWARD AND DOWN
- STEP 4. POSITION TRANSMISSION SHIFT LEVER FORWARD TO SET DIRECTION AND SPEED.
- STEP 5. USE ACCELERATOR FOOT PEDAL TO CONTROL ENGINE SPEED.
- STEP 6. USE BRAKE LEVER TO CONTROL TRADE UP TO PACCAR SPEED WHEN MOVING DOWN BERMES
- STEP 7. USE FOOT BRAKE PEDAL TO SLOW DOWN AND STOP TRACTOR-SCRAPER.

CAUTION: ENGINE SPEED AND TRANSMISSION SHIFT LEVER MUST BE CONTROLLED AND ADJUSTED TO PREVENT ENGINE SPEED EXCEEDING 2,200 RPM. WHEN OVERSPEED WARNING HORN SOUNDS, APPLY BRAKE AND ADJUST TRANSMISSION SPEED TO CONTROL ENGINE OVERSPEED.

CAUTION: WHEN LOW AIR PRESSURE WARNING BUZZER SOUNDS, MOVE PROTECTION LEVER (FIG. 2-12) TO "EMERGENCY". MOVE TRANSMISSION LEVER TO A LOWER SPEED POSITION AND ALLOW TRACTOR TO ROLL TO A STOP.



TRANSMISSION SHIFT PATTERN

1. FOR BULLDOZING AND TRAILER SCRAPER OPERATION SHIFT TO A SPEED RANGE AND ACCELERATE ENGINE SPEED TO ASSUME THE LOAD. WHEN OVERSPEEDED WARNING HORN SOUNDS APPLY BRAKES TO SLOW DOWN EQUIPMENT. AS ENGINE SPEED REDUCES DOWNSHIFT ONE POSITION AT A TIME.
2. FOR OVER THE ROAD TRAVEL MOVE SHIFT LEVER TO "D" IF CONVERTER OIL TEMPERATURE RISES ABOVE NORMAL OR ENGINE LABORS, DOWNSHIFT TO NEXT LOWER SPEED.
3. STOP EQUIPMENT BEFORE SHIFTING TO REVERSE DIRECTION OF TRAVEL.
4. SHIFT TO "N" LOCKS SHIFT LEVER.
5. SHIFT TO "R+1" WHEN USING SCRAPER.

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Figure 2-10. Tractor operating instructions (sheet 2 of 2).

soft dirt or sand to help support the blade. Remove skid shoes when working on hard rocky ground or a stone quarry.

Note. The adjustable pitch strut for increasing or decreasing the pitch angle of the dozer blade is hand operated. It is mounted on the right side of the dozer assembly between the right push beam and the top of the dozer blade.

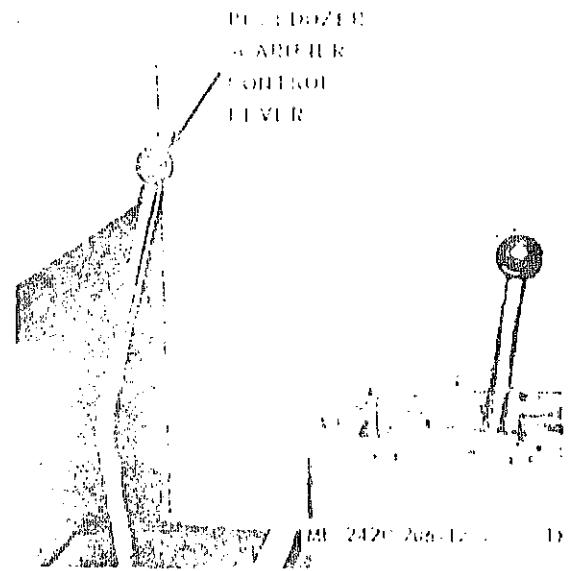
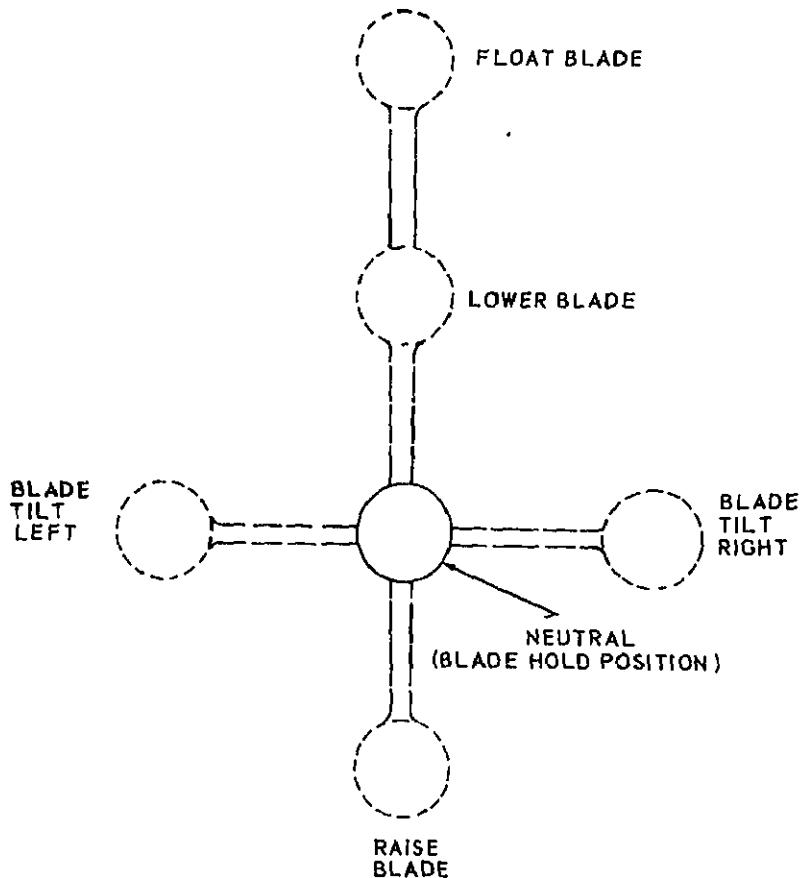


Figure 2-11. Bulldozer and scarifier operating instructions (sheet 1 of 3).



NOTE: CONTROL LEVER AUTOMATICALLY SHIFTS TO NEUTRAL (HOLD) WHEN RELEASED (EXCEPT FLOAT).

1. TO MOVE MATERIAL AND CLEAR AREA OF SHRUBS, SMALL TREES AND BOULDERS, LOWER AND TILT BLADE TO DEPTH AND ANGLE DESIRED WHILE TRACTOR IS MOVING FORWARD (DO NOT RAM).

2. TO UPROOT LARGE TREES, RAISE BLADE TO HIGHEST LEVEL WHILE TRACTOR IS MOVING FORWARD (DO NOT RAM).

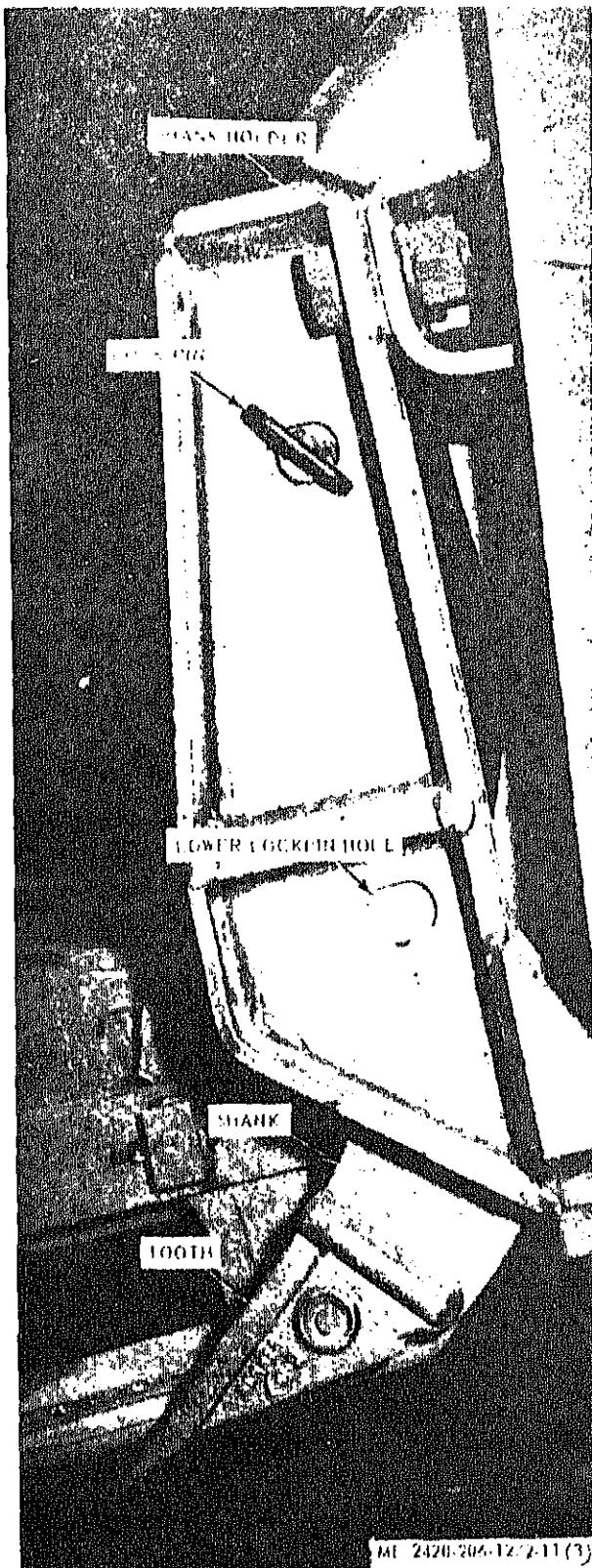
3. BEFORE GRADING AN AREA ATTACH SKID SHOES. LOWER AND TILT BLADE TO DESIRED POSITION WHILE TRACTOR IS MOVING FORWARD SHIFT LEVER TO FLOAT BLADE.

NOTE: SKID SHOES ARE USED FOR GRADING PURPOSES ONLY.

4. REMOVE LOCK PIN LOWER SHANK AND TOOTH AND SECURE WITH LOCK PIN IN LOWER LOCK PIN HOLE.

CAUTION: SUPPORT BLADE WHEN LOWERING OR RAISING SCARIFIER TEETH.

5. LOWER SCARIFIER TEETH (BLADE) TO DESIRED DEPTH AND TILT WHILE TRACTOR IS MOVING BACKWARD (REVERSE) RAISE TEETH (BLADE) WHEN MOVING TRACTOR FORWARD. REPEAT AS NECESSARY TO LOOSEN MATERIAL IN AREA. REFER TO 4 ABOVE AND SECURE TEETH IN RAISED POSITION. REFER TO 1 ABOVE AND MOVE MATERIAL.



a. Correct coolant antifreeze solution for lowest temperature expected, TB-ORD-651. Drain corrosion resister (para 2-2) and remove element before inhibited antifreeze is used in coolant system.

b. Inspect cooling system. Repair or report any leaks.

c. Keep batteries fully charged. After adding water run engine for at least one hour.

d. Keep fuel tank full when not in operation.

e. Lubricate in accordance with current lubrication order.

f. Allow engine to reach normal operating temperature before applying load.

g. Drain moisture from air tanks by operating reservoir drain on instrument panel (fig. 2-7, sheet 2).

h. Before stopping operation, see that equipment is positioned to prevent tires from freezing in mud and water.

i. After operation do not apply parking brake. Put blocks under wheels to prevent tractor from rolling.

2-14. Operation in Extreme Heat

a. Keep radiator filled to 2 inches below filler neck, repair or report coolant leaks.

b. Keep battery electrolyte level to 3/8 inch above plates.

c. Lubricate in accordance to current lubrication order.

2-15. Operation in Sandy or Dusty Areas

a. Keep lubricant containers clean and covered when not in use.

Section VI. OPERATION OF AUXILIARY MATERIEL USED IN CONJUNCTION WITH EQUIPMENT

20. Fire Extinguisher (Dry Chemical Type)

a. Description and Operation.

(1) The 2 1/2 pound fire extinguisher is charged with dry chemicals under pressure and is effective in extinguishing all types of fires starting and confined in small areas of equipment and in cold weather temperatures to -25 F. (-31 C.). When extinguisher is winterized for extreme cold temperatures (nitrogen) fires can be extinguished in temperatures below -25 F. (-31 C.).

(2) Remove fire extinguisher from equipment, handle, press lever, using a

g. Lubricate in accordance to current lubrication order.

d. Service engine crankcase, transmission system, and hydraulic system breathers as necessary.

e. Service fuel filters, hydraulic oil filter, engine oil filters daily or as necessary.

f. Service air cleaner as indicated by separator on dash panel.

2-16. Operation Under Rainy or Humid Conditions

a. Keep fuel tanks full at all times.

b. Release moisture from air system frequently.

c. Remove moisture from batteries and Keep wiring dry.

d. Keep exposed finished parts and parts lubricated.

2-17. Operation in Salt Water Area

a. After operation, wash tractor with fresh water when available.

b. Dry all exposed wiring terminals, battery cables.

c. Lubricate in accordance to current lubrication order.

2-18. Operation in Mud or Deep Water

a. Clean equipment with fresh water available after operation.

b. Dry exposed wiring terminals, battery cables.

2-19. Operation in High Altitudes

Refer to DS maintenance when tractor is operated at higher altitudes.

direct powered spray at base of flames.

b. Maintenance.

(1) When pressure indicator reading is below 125 psi, seal is broken or weight is less than 10 pounds, replace extinguisher.

(2) Replace used fire extinguishers immediately.

2-21. Engine Starting Aid

a. A starting aid cylinder (fig. 2-12) contains ether under pressure and is used to

e in cold weather temperatures, below 32° F.
). The cylinder and valve is mounted inside
n lower right side.

When starter switch is depressed (fig. 2-7)
engine is cranking, pull out quick start knob
or 2 seconds, then push knob in.

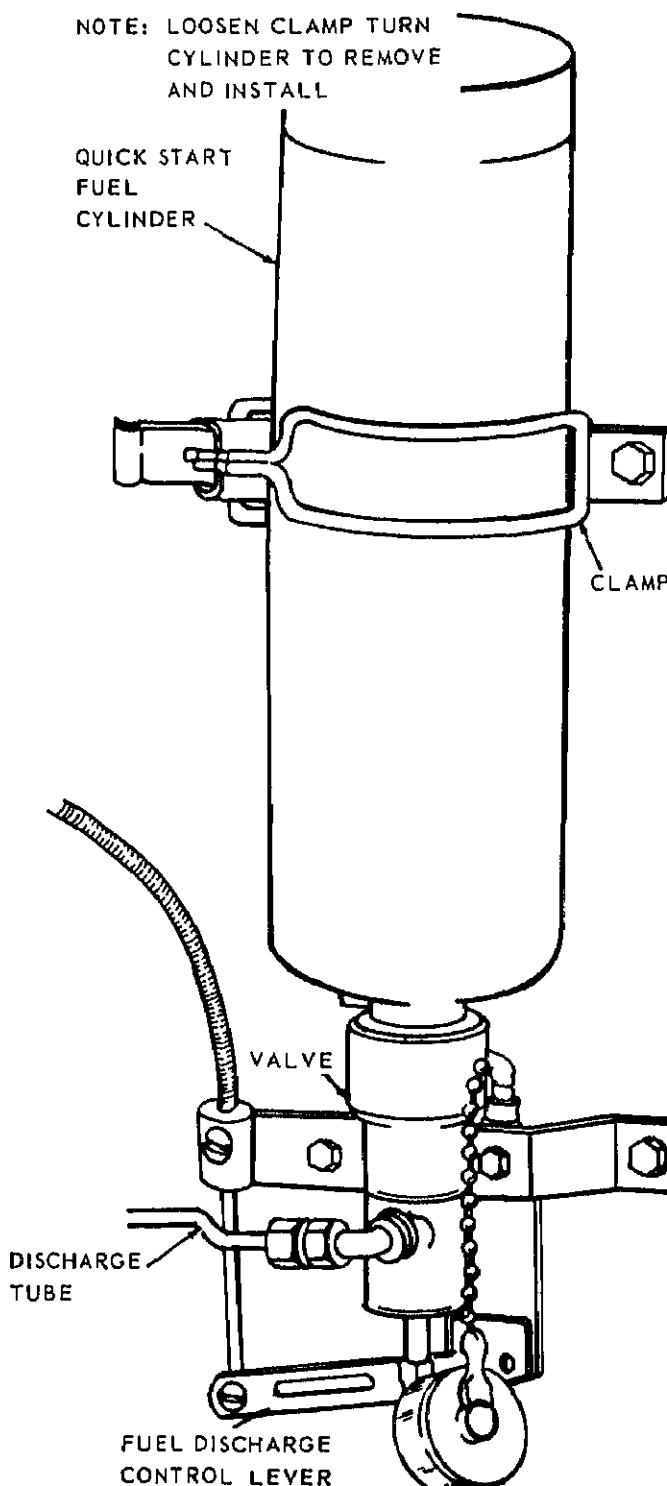
ote. Do not use quick start knob when engine is oper-
r before cranking has started.

Warning: Ether is highly explosive. Do not
heat to cylinder, or store cylinders where
may become excessive; do not throw empty
ders in an open fire. Cylinder can explode
ause death or serious injury to personnel.

NOTE: LOOSEN CLAMP TURN
CYLINDER TO REMOVE
AND INSTALL

QUICK START
FUEL
CYLINDER

CLAMP



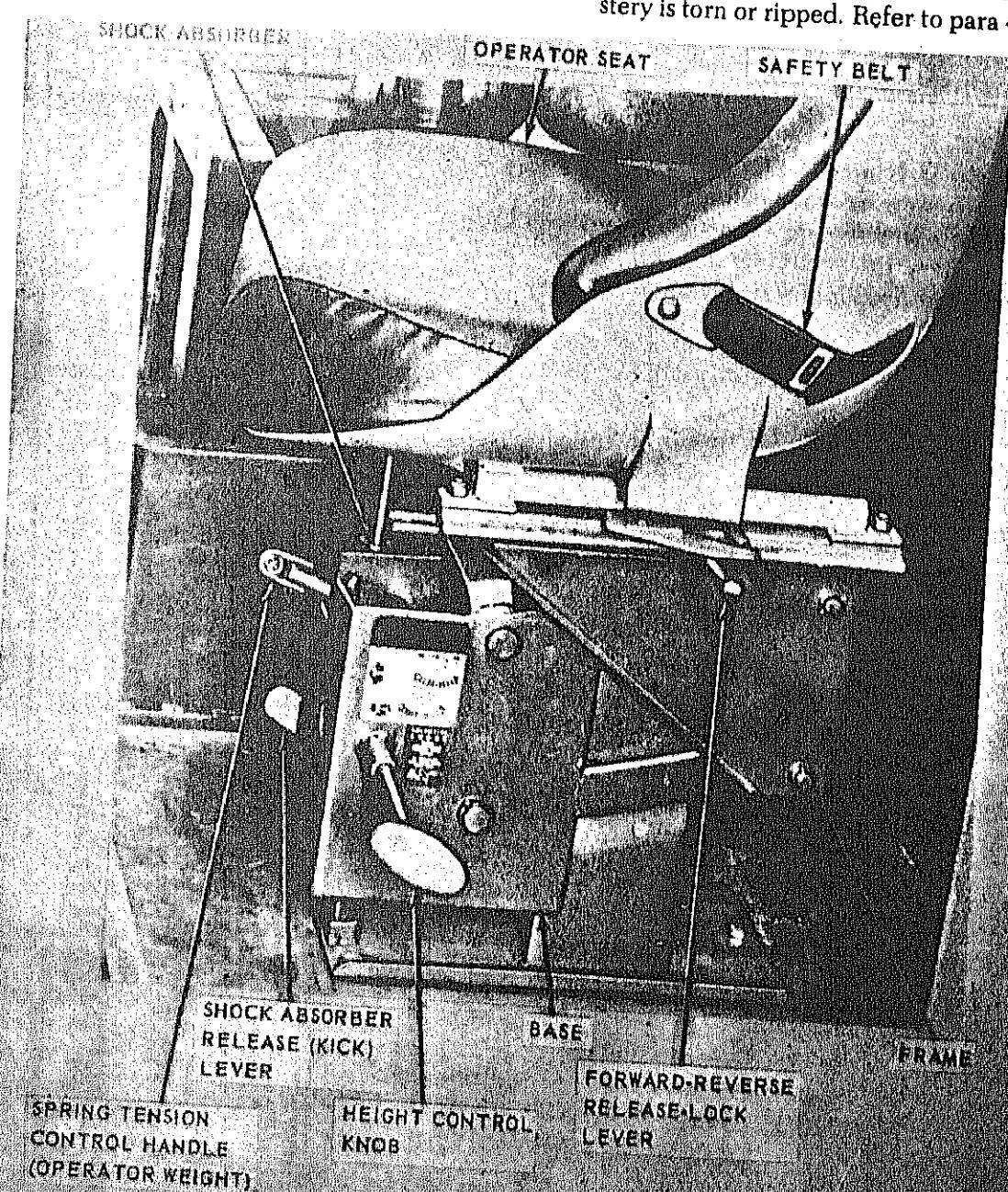
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Figure 2-12. Engine starting aid.

a. Operator shall check all safety belt attachments before starting and operating the equipment.

b. Operator seat adjustment is illustrated in figure 2-13.

c. Repair or replace seat cushions when they are torn or ripped. Refer to para 4-62.



SHOCK ABSORBER
RELEASE (KICK)
LEVER
SPRING TENSION
CONTROL HANDLE
(OPERATOR WEIGHT).

HEIGHT CONTROL
KNOB

BASE

FORWARD-REVERSE
RELEASE-LOCK
LEVER

STEP 1: WITH OPERATOR SEATED, RELEASE SHOCK ABSORBER AND ADJUST SPRING TENSION FOR 2 INCH (MIN) CLEARANCE BETWEEN TOP OF BASE AND BOTTOM OF FRAME.

STEP 2: CONTROL HEIGHT POSITION AND FORWARD-REVERSE POSITION AS DESIRED WITH KNOB AND LEVER.

NOTE: SHOCK ABSORBER IS POSITIONED TO SWING AUTOMATICALLY.

ts cannot be corrected.

Tractor Engine Emergency Starting

General. When a replacement starter or battery cable is not available, the engine may be towed or pushed the tractor.

Caution: To prevent damage to push start when towing or pushing tractor backward when stopped, remove propeller shafts to rear axles.

Towing or Pushing.

(fig. 2-14,  2 mph over pressure, accelerator lever to used (1 engine allow engine 700 to 750 rpm.

CHAPTER 3

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. OPERATOR'S AND ORGANIZATIONAL MAINTENANCE REPAIR PARTS, TOOLS AND EQUIPMENT

3-1. Tools and Equipment

No special tools or equipment are required by operator and organizational maintenance personnel for maintenance of tractor.

3-2. Organizational Maintenance Repair Parts

Organizational maintenance repair parts are in TM 5-2420-206-20P.

Section II. LUBRICATION

3-3. General Lubrication Information

This section contains lubrication instructions which are supplemental to, and not specifically covered in the lubrication order. For current lubrication order, refer to DA Pam 310-4.

3-4. Detailed Lubrication Information

a. Care of Lubricants. Keep all lubrication containers in a clean, dry place away from heat. Allow no dust, dirt, or other foreign material to mix with lubricants in containers. Keep all equipment clean and ready for use.

b. Cleaning. Keep external components of the tractor free of lubricants that are splashed, spilled, or dropped on the equipment. Wipe all lubricating points before and after lubricating.

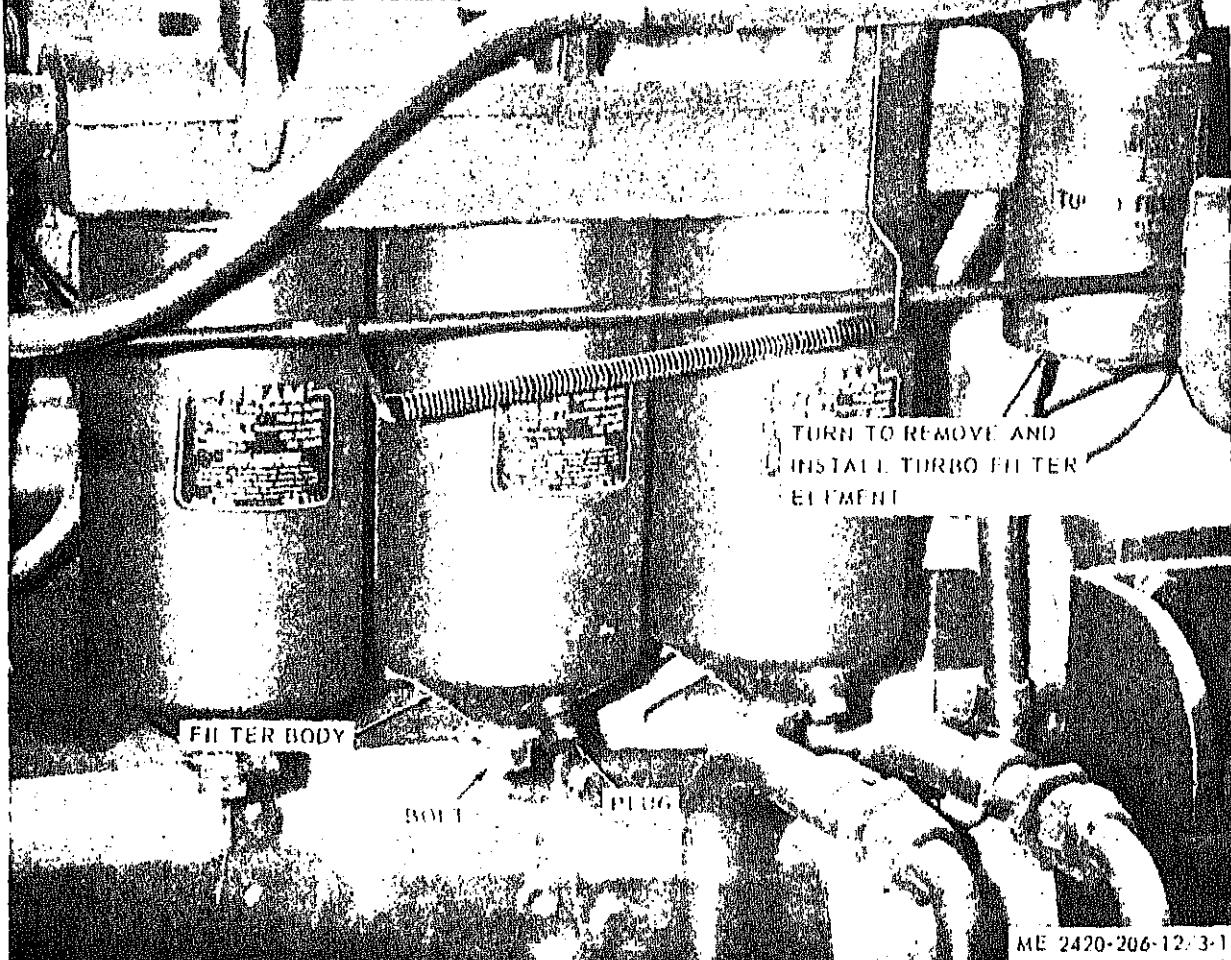
c. Points of Lubrication. Service lubrication points at proper intervals as indicated on LO 5-420-206-12.

d. Turbocharger Lubrication. Filtered engine crankcase oil lubricates turbocharger turbine. During dusty, hot weather operating conditions, check engine crankcase oil level frequently and change turbocharger oil filter more frequently than usual in accordance with current lubrication order.

e. Transmission Oil Level. Check transmission oil level with engine operating at idle speed and transmission at operating temperature.

3-5. Engine Oil System Service

a. Filters. Service engine oil system filters as illustrated in figure 3-1. After servicing, start engine and check filters for leaks. Wait 30 minutes, then check if engine oil level is up to full mark on dipstick. Check gages for proper pressure (see figure 2-71).

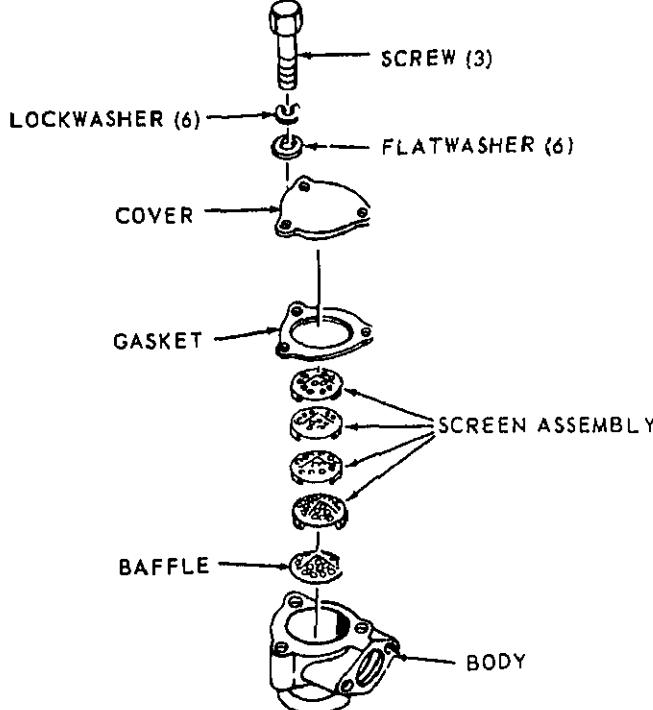


1. REMOVE PLUG, DRAIN OIL FROM FILTER BODY.
2. REMOVE BOLT, FILTER BODY, FILTER ELEMENT AND GASKETS, CLEAN FILTER BODY.
3. INSTALL NEW FILTER ELEMENT AND GASKETS, INSTALL FILTER BODY, BOLT AND PLUG.
NOTE REMOVE AND INSTALL OTHER FILTER ELEMENTS IN A SIMILAR MANNER.
4. REMOVE DIRTY TURBO FILTER ELEMENT, INSTALL NEW FILTER ELEMENT. CORRECT OPERATIONAL LEAKS AS NECESSARY.

Figure 3-1. Engine oil system filter service.

b. Engine Crankcase Breather. Service engine crankcase breather as illustrated in figure 3-2.

Under conditions of extreme dust, clean the engine crankcase breather daily.



- STEP 1. REMOVE SCREWS, LOCKWASHERS, FLATWASHERS, COVER, GASKET, SCREEN ASSEMBLY AND BAFFLE FROM BODY.
- STEP 2. CLEAN METAL PARTS WITH SOLVENT, DRY THOROUGHLY.
- STEP 3. REPLACE GASKETS AND DEFECTIVE ITEMS.
- STEP 4. INSTALL IN REVERSE ORDER OF REMOVAL.

ME 2420-206-12/3-2

Figure 3-2. Engine crankcase breather service.

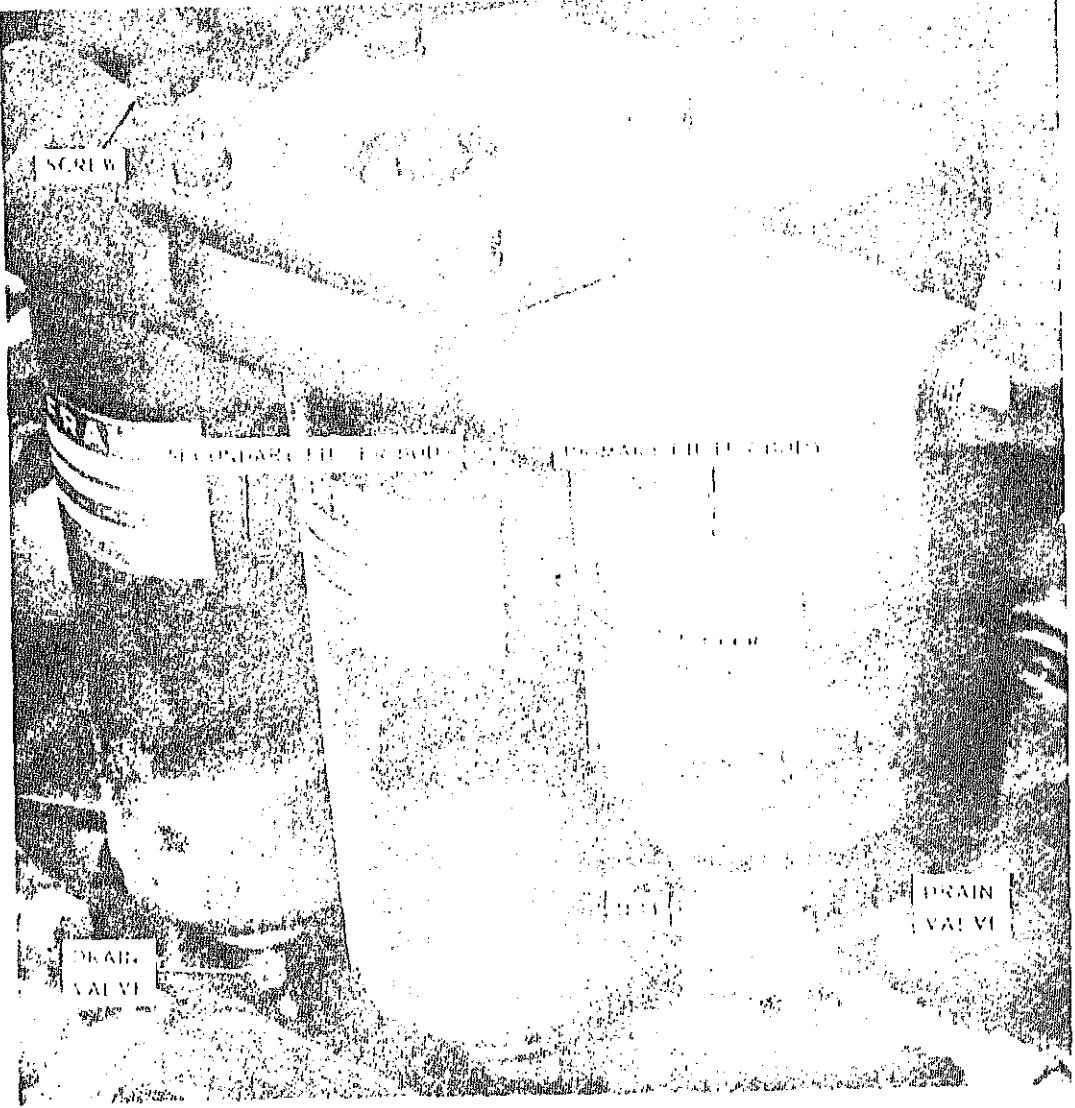
3-6. Fuel System Service

a. Filters. Service fuel filters as illustrated in figure 3-3. Inspect for leaks.

b. Fuel Tank Strainer Service. Service fuel tank

strainer as illustrated in figure 3-4.

c. Engine starting aid. Service starting illustrated in figure 2-12.

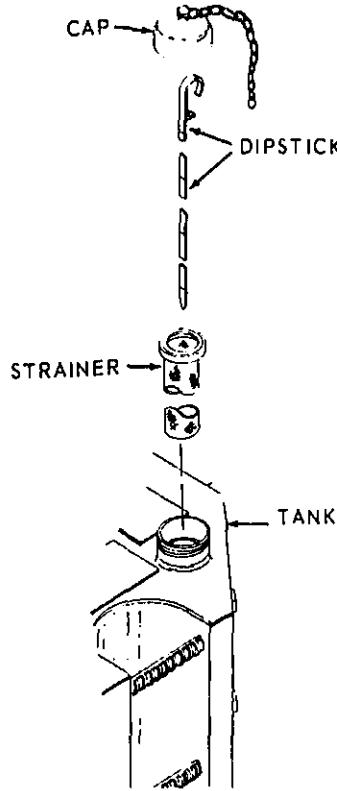


1. DRAIN FILTER BODY.
2. REMOVE SCREW SECONDARY FILTER BODY, FILTER ELEMENT.
3. CLEAN FILTER BODY.
4. INSTALL NEW FILTER AND FILTER ELEMENT BODY AND SCREW.
CLOSE DRAIN VALVE.

NOTE: REMOVE AND REUSE FILTER ELEMENT IF FILTER ELEMENT IS DAMAGED.

5. REMOVE GUT AND PRIMARY FILTER BODY, REMOVE FILTER ELEMENT.
6. CLEAN FILTER BODY, CLEAN FILTER ELEMENT, REMOVE DRAIN VALVE.
7. INSTALL ELEMENT, BODY AND GUT. CLOSE DRAIN VALVE.

Figure 3-3. Fuel filter service.



STEP 1. REMOVE CAP, DIPSTICK AND STRAINER FROM TANK.

STEP 2. CLEAN STRAINER WITH SOLVENT AND DRY THOROUGHLY.

STEP 3. INSTALL IN REVERSE ORDER OF REMOVAL.

ME 2420-206-12/3-4

Figure 3-4. Fuel tank strainer service.

3-7. Transmission and Torque Converter and Hydraulic Oil System Service

a. Transmission and Torque Converter Service. (1) Draining.

(a) Drain transmission and torque converter every 500 operating hours. Operate tractor until temperature of 180 to 200 F. is indicated on converter oil temperature gage (fig. 2-7).

(b) Provide containers large enough to catch 18 gallons of oil used in system. Remove drain plugs from bottoms of torque converter and transmission.

(c) Check first oil emitted for metallic particles that indicate internal transmission damage.

(e) Service filter as illustrated in figure
(f) Remove six capscerws, flat washers, lockwashers securing rear rock guard. Remove capscerws and lockwashers that secure oil bottom of transmission; remove oil pan. Thoroughly clean screen exposed when oil pan is removed. Remove, clean, and install two magnets.

(g) Install oil pan using new gaskets.
(2) Filling.

(a) Fill transmission, refer to current proper transmission fluid.

(b) Remove fill plug from top right of converter and fill transmission and torque converter hydraulic system.

(c) Fill converter with oil fluid.

prime transmission and torque converter lines.

(e) With engine running at 700 to 750 rpm, add transmission fluid to bring the level to the full mark on dipstick. Operate until a temperature of 180° to 200° F. is indicated on converter oil temperature gage; recheck level and add fluid if necessary.

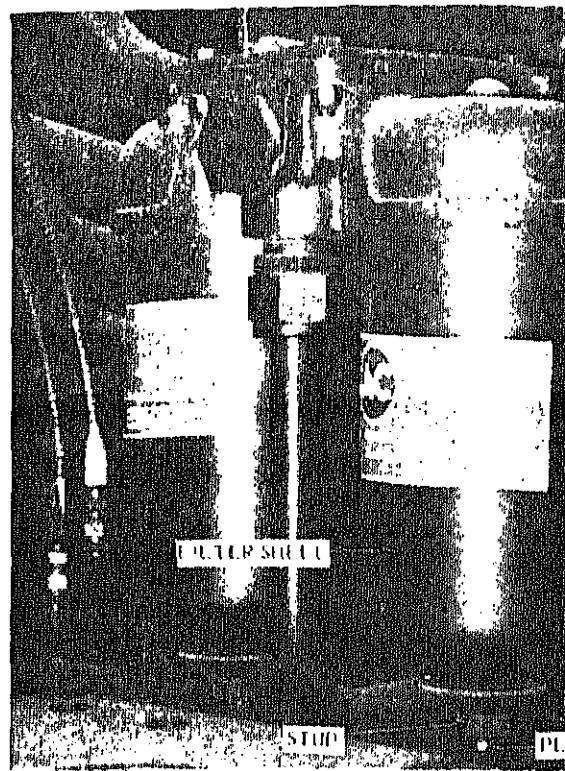
b. *Hydraulic Oil Tank Element and Strainer.* Service element and strainer as illustrated in figure 3-6.

3-8. Air Cleaner Filter Service

a. *Service Indicator.* Air cleaner service indicator on dash panel will show red when filter service is necessary. Push plunger under indicator to reset.

b. *Filter.* Service air filter as illustrated in figure 3-7.

Caution: Do not attempt to clean and reuse dirty filter element. Cleaning can rupture filter elements permitting dirt particles to enter engine. Do not use if dropped. Use extreme care when installing element.

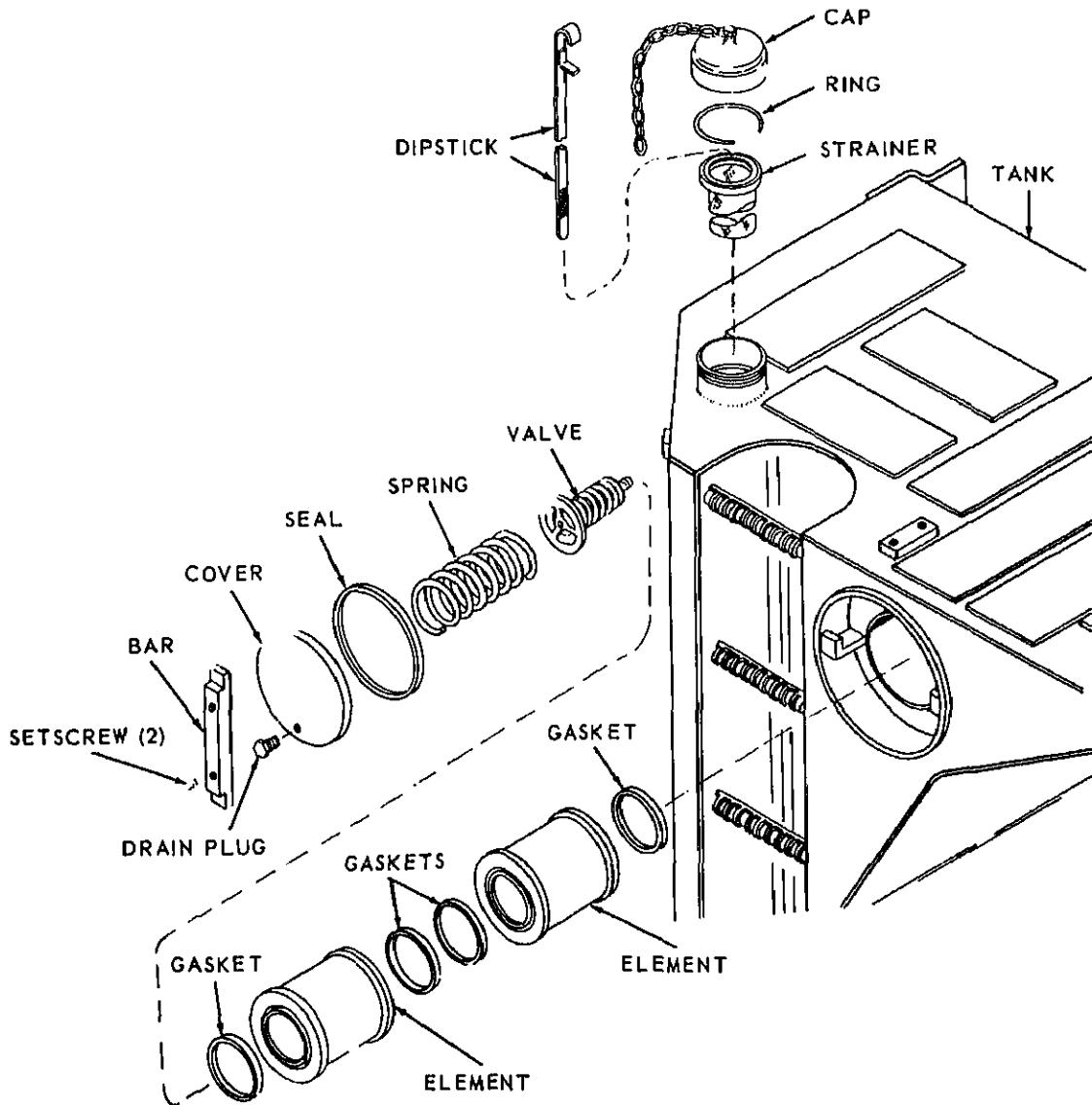


1. REMOVE PLUG, DRAIN OIL FROM SHELL.
2. REMOVE STUD, FILTER SHELL, FILTER AND GASKETS, CLEAN SHELL.
3. INSTALL NEW FILTER ELEMENT AND GASKETS, INSTALL FILTER SHELL, STUD AND PLUG.

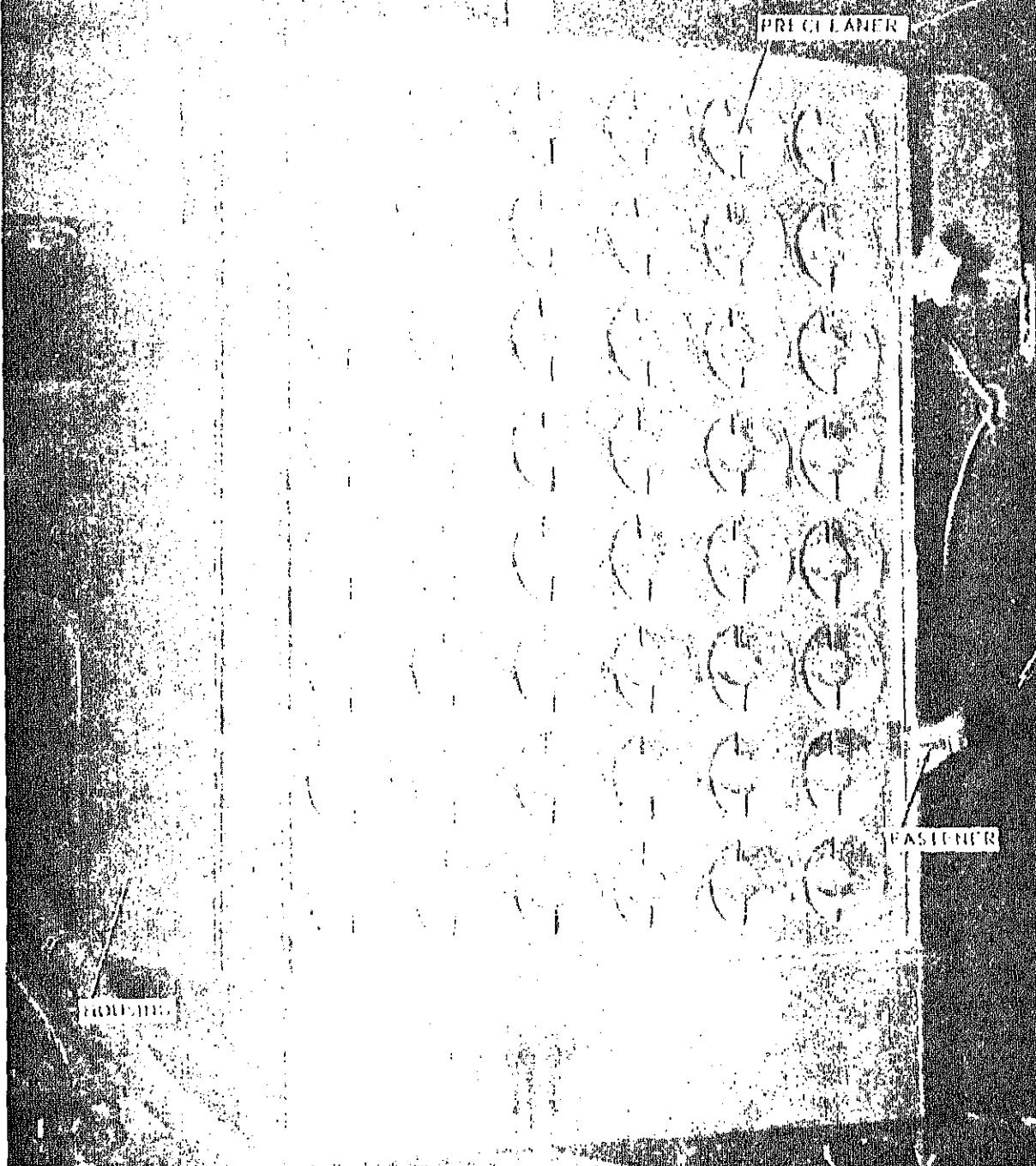
NOTE: REMOVE AND INSTALL OTHER FILTER ELEMENT IN A SIMILAR MANNER.

ME 2420 206 1

Figure 3-5. Transmission and torque converter, oil filter



- STEP 1. REMOVE CAP, DIPSTICK, RING AND STRAINER FROM TANK.
- STEP 2. CLEAN AND DRY STRAINER. REPLACE DAMAGED STRAINER AND INSTALL IN REVERSE ORDER OF REMOVAL.
- STEP 3. REMOVE DRAIN PLUG FROM COVER AND ALLOW OIL TO DRAIN FROM ELEMENT HOUSING.
- STEP 4. LOOSEN SETSCREWS AND REMOVE BAR, COVER, SEAL, SPRING, VALVE, GASKETS AND ELEMENTS FROM TANK HOUSING.
- STEP 5. CLEAN TANK ELEMENT HOUSING. REPLACE GASKETS, ELEMENTS, AND DEFECTIVE SPRING, SEAL AND VALVE. INSTALL PARTS IN REVERSE ORDER REMOVAL. FILL TANK (SEE LO).



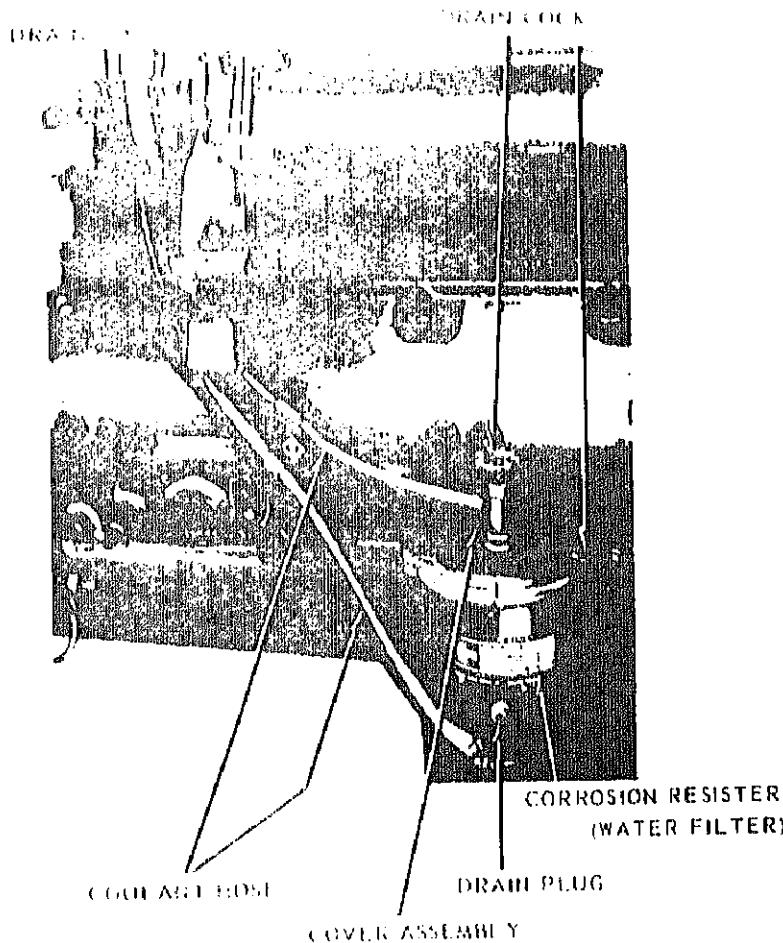
1. RELEASE THE SEEDS TO REMOVE PRE-CLEANER AND FILTER.
2. CLEAN THE OUTSIDE OF THE FILTER DAMPENED CLEAN CLOTH.
3. CLEAN THE PRE-CLEANER, USE AIR PRESSURE AND CLEAN.
4. REASSEMBLE, REWIRE SEEDS, RE-INSTALL PRE-CLEANER AND SECURE
WITH THE FASTENERS.

Figure 3-7. Air cleaner filter service.

3-9. Water Filter Service (Corrosion Resister)

Service water filter as illustrated in figure 3-8. Install new gasket.

CLOSE DRAIN COCKS AND OPEN COOLING SYSTEM WHEN
REMOVING AND CLEANING ELEMENT IS INSTALLED.



- STEP 1. CLOSE DRAIN COCKS, REMOVE DRAIN PLUG.
- STEP 2. REMOVE BOLTS, COVER ASSEMBLY AND GASKET FROM CORROSION RESISTER.
- STEP 3. REMOVE PLATE, CARTRIDGE, PLATE AND SPRING FROM FILTER .
- STEP 4. USE CLEAN WATER AND FLUSH PLATES; SPRING AND FILTER.
- STEP 5. OPEN DRAIN COCKS, CORRECT LEAKS, FILL RADIATOR.

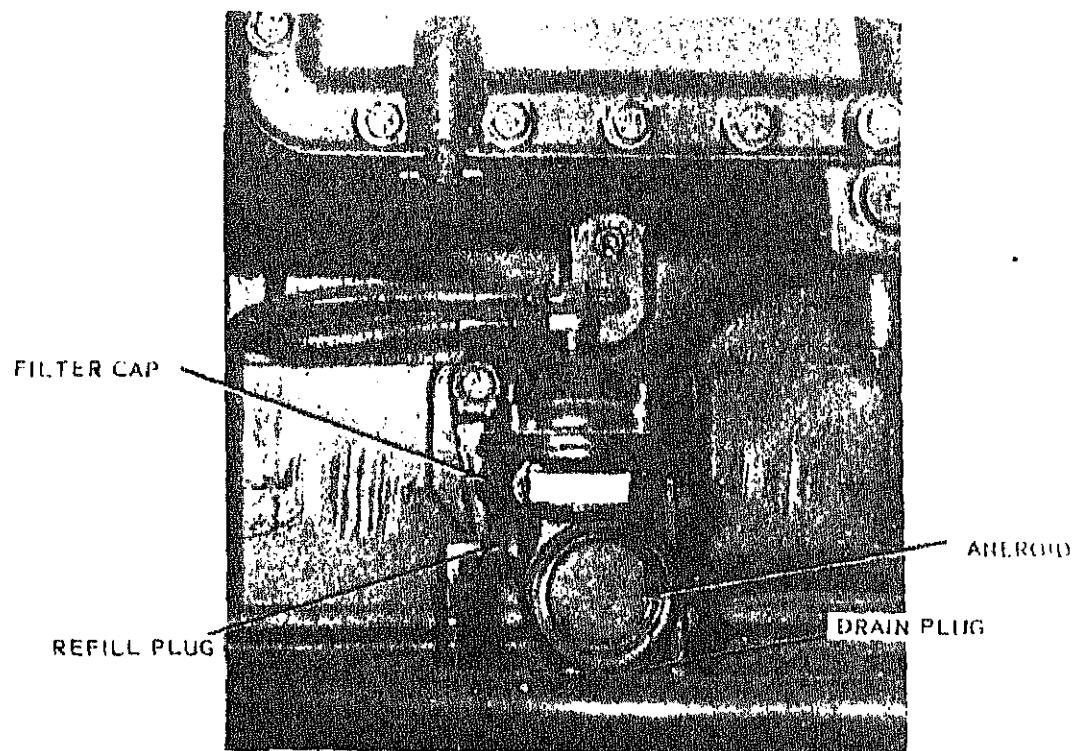
CAUTION: BEFORE ADDING ANY INHIBITING AGENT TO
COOLING SYSTEM CLOSE DRAIN COCKS.

NOTE:

WHEN COOLING SYSTEM DOES NOT CONTAIN
ANTIFREEZE, USE CHROMATE TYPE FILTER
ELEMENT FSN 2930-789-0651, P/N 13272.

10. Aneroid Filter Service

Service aneroid filter, figure 3-9.



- STEP 1. REMOVE DRAIN PLUG AND DRAIN OIL., REPLACE DRAIN PLUG.
- STEP 2. REMOVE FILTERCAP, SPRING AND FILTER FROM ANEROID.
- STEP 3. CLEAN FILTER WITH SOLVENT, DRY THOROUGHLY.
- STEP 4. INSTALL IN REVERSE ORDER OF REMOVAL.
- STEP 5. REFILL OIL SUPPLY (SEE LO).

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Figure 3-9. Aneroid filter service.

11. Fuel Pump Filter Service

Service fuel pump filter, figure 3-10.



STEP 1. REMOVE FILTER CAP, GASKET, SPRING, STRAINER CAP AND STRAINER.

STEP 2. FLUSH ALL PARTS WITH DIESEL FUEL. REPLACE DEFECTIVE PARTS.

STEP 3. INSTALL IN THE REVERSE ORDER OF REMOVAL.

ME 2420-206-12-3-10

Figure 3-10. Fuel pump filter service.

12. Breather Service (Small)

a. Remove breathers from midmount bearing, axle fluid reservoirs, fuel tank, transmission housing, front and rear axle housings.

b. Clean breathers in P-D-680 solvent and dry thoroughly. Inspect for damage, replace damaged breathers.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

13. General

a. To insure that the 290M tractor is ready for operation at all times, it must be inspected systematically so that defects may be discovered and corrected before they result in serious damage or failure. Necessary preventive maintenance checks and

is noted during operation which would damage equipment if operation were continued.

c. Defects discovered during operation of the unit will be noted for future correction, to be made as soon as operation has ceased.

d. All deficiencies and shortcomings will be re-

Item Number	Operator				Org		Item to be inspected	Procedure				
	Daily				M	Q						
	B	D	A	W								
1								LUBRICATE IN ACCORDANCE WITH CURRENT LUBRICATION ORDER				
	x			x	x		Coolant level in radiator.	Correct level to 2 inches below filler neck.				
	x				x		Cold weather protection	Service coolant system for lowest freezing temperature expected.	TI			
			x		x	x	Radiator air passages.	Clean clogged air passages.	FI			
			x		x	x	Corrosion resister (water filter).	Service corrosion resister (water filter).	PA			
			x		x	x	Temperature gage reading.	Normal operating temperature is 165° to 195° F.	PA			
	x			x	x	x	Check for coolant leaks.	Note. Replace a defective thermostat if temperature cannot be controlled (below 220° F.).	FI			
			x	x	x	x	Security of hardware mounted items	Correct coolant leaks in lines, hoses fittings, valves, filter, and water manifold. Refer leaks in radiator to DS maintenance.				
			x	x	x	x		Replace missing hardware and secure coolant system items.				
			x	x	x	x		Note. Refer to DS maintenance as necessary.				
2								ENGINE OIL SYSTEM (TURBOCHARTER)				
	x				x		Crankcase oil level.	Correct level to full mark on dip stick gage.	SE			
					x	x	Crankcase breather and filters.	Service dirty breather and filters.	PA			
			x		x	x	Oil pressure gage reading.	At idle engine speed 7-10 psi, at maximum speed 35 psi (min.).	PA			
		x	x		x	x	Check for oil leaks.	Correct leaks in exposed lines, hoses and fittings. Refer other oil leaks to DS maintenance.	FI			
		x	x	x	x	x	Security of hardware mounted	Replace missing hardware and secure oil system items.				
		x	x	x	x	x		Note. Refer to DS maintenance as necessary.				
		x	x	x	x	x		FUEL SYSTEM				
		x	x	x	x	x	Level of fuel in tank.	Correct level to full mark on dip stick gage.				
		x	x	x	x	x	Tank breather.	Service dirty breather	P			
		x	x	x	x	x	Tank strainer.	Service dirty strainer.	P			
		x	x	x	x	x	Air cleaner.	Service dirty air cleaner filter.	P			
		x	x	x	x	x	Aneroid control.	Service control (oil). Service dirty filter.	P			
3							Pump filter.	Service dirty filter.	P			
							Fuel filters.	Service dirty filters.	P			
	x	x			x	x	Check for fuel leaks.	Correct fuel leaks in lines, hoses, fittings (exposed), filters, and tank.	F			

Item Number	Interval					Item to be inspected	Procedure	Reference			
	Operator			Org.							
	Daily		M	O							
B	D	A	W								
7											
	x			x	x	Check transmission oil level.	HYDRAULIC OIL SYSTEMS (TRANSMISSION-CONVERTER) (MAIN)	See LO, p			
				x	x	Transmission breather.	Check level with engine operating at low idle speed; fill to level mark on dip stick gage.	Para 3-12			
				x	x	Transmission oil filters.	Service dirty breather.	Fig. 3-7			
	x	x		x	x	Transmission and converter gage readings.	Service dirty filters.	Fig. 2-7			
	x			x	x	Level of oil in main tank.	Normal operating transmission pressure gage reading is 180 to 300 psi.	See LO			
				x	x	Main tank filter and strainer.	Converter temperature gage reading is less than 250°F.	Fig. 3-6			
	x		x	x	x	Check for leaks.	Fill to level mark on dip stick gage.	Fig. 1-5 and para 3-7			
8											
	x	x	x	x		Cutting edge and end bits.	Service dirty filter and strainer.	Para 4-3			
	x	x	x	x		Skid shoes.	Correct leaks in oil lines, filters, hoses, and fittings. Drain and replace if worn, cracked, frayed, or damaged.	Para 4-6			
	x	x	x	x		Scarfier.	Refer transmission control valve, converter charging pump and other hydraulic oil leaks to DS maintenance.	Para 4-4			
			x	x		Security of hardware mounted items.	MOLDBOARD ASSEMBLY	Para 4-1			
9			x	x		Cab, hood, glass.	Replace worn, broken, distorted cutting edge and end bits.	Para 4-17			
			x	x		Frame, rock guards, ladders.	Replace if worn, damaged, broken, or distorted.	Para 4-58			
10											
	x	x	x	x	x	Air pressure.	BODY AND FRAME				
	x	x	x	x	x	Tire wear and damage.	Repair or replace hood. Refer other damage to DS maintenance.				
	x	x	x	x	x	Differential and final drive oil level.	Check for creaks, breaks and other damage. Repair or replace rock guard and ladders. Refer other damage to GS maintenance.				
	x	x	x	x	x		TIRES AND FINAL DRIVE (PLANETARY) OIL LEVEL				
	x	x	x	x	x		Correct tire air pressure is 45 psi (max.), 25 psi (min.).	Para 4-63			
	x	x	x	x	x		Check for wear, blisters, bruises. Remove imbedded foreign objects.	Para 4-63			
	x	x	x	x	x		Replace worn, damaged and defective tires.	TM 9-187			
	x	x	x	x	x		Service differential and final drives (planetary). Report presence of particles in oil to DS maintenance.	See LO, F			
							Prevent oil from contacting tires;				

Item Number	Interval				B- Before operation D- During operation	A- After operation W- Weekly	M- Monthly Q- Quarterly			
	Operator		Org.							
	Daily		M	Q						
	B	D	A	W						
1	x	x			Midmount bearing mounted on inside front of rear frame unit, driven by a propeller shaft from the transmission and drives a propeller shaft to rear axle.	Check for oil leaks. Refer to DS maintenance as necessary.				
2	x		x	x	Check for wear and defects.	BELTS Replace defective belts.	Paras 4-28, 4-38			
3	x	x	x		Brake assembly.	BRAKES Check for loose nuts. Check for overheated drums. Check for lining wear.	Para 4-50			
4	x		x		Universal coupling.	UNIVERSAL COUPLING Check for creaks, distortion, broken weldments, and other damage, refer to DS maintenance. Service universal coupling.	See LO			
	x	x			Steering gear ay.	STEERING Check for leaks or other damage. Refer to DS maintenance.				
	x	x		x	Drag link ay.	Check for damage and proper adjustment. Adjust as necessary.	Para 4-21			

Section IV. OPERATOR'S MAINTENANCE

3-14. Control Panel Light Bulbs

- a. Remove damaged or defective control panel para 2-7) warning and panel light lens, reflectors and bulbs.
- b. Replace defective light bulbs, tag and disconnect leads and clean lens and reflectors as necessary.

3-15. Tractor Light Lamps

a. Headlight and Floodlight Lamps. Remove rubber lamp retainers, disconnect lead and replace damaged or defective sealed beam lamps. Replace retainers as necessary.

b. Blackout Headlight. Remove 3 screws and door. Replace damaged or defective sealed beam lamp, disconnect leads. Remove the C-washer and slip off the shell. Assemble in reverse order.

c. Taillight and Stoplight Lamps. Remove 2

3-16. Radiator

a. Check to be sure radiator, engine cylinder block, water pump body, and air compressor drain cocks are closed. Remove radiator cap, fill radiator with clean fresh water. Open vent cock at top of thermostat housing (fig. 4-24) to allow trapped air to escape; close the vent cock when water flows from it. Install radiator cap.

Caution: Avoid adding water to a hot engine. Wait until engine has cooled. If necessary to add water to hot engine, add water slowly while the engine is running at a fast idle.

b. Winter. Use ethylene-glycol base antifreeze the percentage required for winter protection. Do not use a corrosion inhibitor in addition to an antifreeze. Antifreeze is compatible with the corrosion resistor.

c. Draining and Cleaning.

and run water through cooling system with drain cocks open until water coming out is clean. Close corrosion resistor valves.

(3) Chemical cleaning. If excessive rust and

system with a cleaner such as sodium bisulphite or oxalic acid. Follow chemical cleaning by neutralizing and flushing. Always open the corrosion resistor valves during cleaning of cooling system.

Section V. TROUBLESHOOTING

17. General

This section provides information useful in diagnosing and correcting unsatisfactory operation or failure of the 290M tractor and its components. Malfunctions which may occur are listed in table

3-2. Each malfunction stated is followed by a list of probable causes of the trouble. The corrective action recommended is described opposite each probable cause.

Table 3-2. Troubleshooting

Malfunction	Probable cause	Corrective action
1. Engine fails to start.	<ul style="list-style-type: none">a. Master or main switch OFF.b. Fuel tank empty.c. Fuel system filters dirty.d. Fuel shutdown valve defective.e. Aneroid valve defective.f. Fuel lines leaking or restricted.g. Other causes.	<ul style="list-style-type: none">a. Turn switches ON (fig. 2-7).b. Fill tank.c. Service filters (figs. 3-3, 3-9, and 4-27).d. Replace fuel shutdown valve (fig. 4-27).e. Replace aneroid valve (fig. 4-28).f. Correct leaks and replace defective exposed lines (fig. 1-8).g. Refer other causes to DS maintenance.
2. Starter does not crank engine.	<ul style="list-style-type: none">a. Master or main switch OFF.b. Electric cable connection loose.c. Defective starter.d. Batteries discharge.e. Starter solenoid defective.f. Faulty starter.g. Starter switch defective.h. Other causes.	<ul style="list-style-type: none">a. Turn switches ON.b. Tighten cable connections including battery.c. Replace starter (fig. 4-21).d. Replace batteries (fig. 4-47).e. Replace starter solenoid (fig. 4-21).f. Replace starter brushes or starter (fig. 4-21).g. Replace starter switch (fig. 4-15).h. Refer to DS maintenance.
3. Engine overheats	<ul style="list-style-type: none">a. Coolant level low.b. Crankcase oil level low.c. Radiator air passages clogged.d. Thermostat defective.e. Other causes.	<ul style="list-style-type: none">a. Fill radiator.b. Fill crankcase (see LO).c. Clean air passages.d. Replace thermostat (fig. 4-24).e. Refer to DS maintenance.
4. Generator output low or not charging.	<ul style="list-style-type: none">a. Generator belt loose or defective.b. Generator defective.c. Generator regulator defective.d. Cables connections loose.e. Other causes.	<ul style="list-style-type: none">a. Replace belt, and correct belt tension.b. Replace generator.c. Replace regulator.d. Tighten connections.e. Refer to DS maintenance.
5. Batteries do not hold charge	<ul style="list-style-type: none">a. Electrolyte level low.b. Loose terminals or cables.c. Defective battery.d. Other causes.	<ul style="list-style-type: none">a. Add water.b. Tighten connections.c. Replace battery (fig. 4-47).d. Refer to DS maintenance.
6. Engine knocks.	<ul style="list-style-type: none">a. Crankcase oil level low.b. Oil leaks in lines and filters.c. Other causes.	<ul style="list-style-type: none">a. Fill crankcase (see LO).b. Correct oil leaks.c. Refer to DS maintenance.

Malfunction	Probable cause	Corrective action
8. Brakes do not operate.	<ul style="list-style-type: none"> e. Fuel filters dirty. f. Other causes. a. Air in system trapped. 	<ul style="list-style-type: none"> e. Service fuel filters (fig. 3-3). f. Refer to DS maintenance. a. Bleed air system (fig. 1-4). Correct leaks
9. Main hydraulic system fails.	<ul style="list-style-type: none"> b. Brake oil reservoir breather dirty. c. Low oil in reservoir. d. Other causes. a. Hydraulic oil level low. b. Leaks in lines. c. Tank element dirty. d. Other causes. 	<ul style="list-style-type: none"> b. Service breather (para 3-12). c. Add oil (see LO) Correct leaks. d. Refer to DS maintenance. a. Fill hydraulic tank (see LO). b. Correct leaks. c. Service tank elements (fig. 3-6). d. Refer to DS maintenance.
10. Transmission converter hydraulic system fails.	<ul style="list-style-type: none"> a. Low oil level in system. b. Oil filters dirty. c. Leaks in external line. d. Other causes. 	<ul style="list-style-type: none"> a. Add oil (see LO). b. Service oil filters (fig. 3-5). c. Correct leaks in line (fig. 1-5). d. Refer to DS maintenance.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE PROCEDURES

Section I. BULLDOZER ASSEMBLY

4-1. General

a. *Bulldozer*. The bulldozer consists of a blade, push beams, pitch strut, and skid shoes. The push beams are trunnion mounted to balls on the sides of the frame which provide the pivot points for the push beams. The bulldozer blade is attached to the push beams by pivot pins so that the blade can pivot on the push beams. An adjustable pitch strut is connected between the right push beam and the top of the bulldozer blade. The tilt hydraulic cylinder is connected between the left push beam and top of bulldozer blade. Adjustable position skid shoes are provided under the fronts of the push beams. The blade is fitted with replaceable cutting edge, and end bits.

b. *Scarifier*. Four scarifiers are bolted to the rear of the bulldozer blade. When released for use, they score the earth while the tractor moves in a reverse direction to allow easier working of the earth with the blade.

c. *Inspection*. Inspect bulldozer assembly and operating components daily for damage or defects.

4-2. Bulldozer End Bits

a. *Removal*. Remove bulldozer end bits as illustrated in figure 4-1.

b. *Cleaning and Inspection*.

(1) Clean all parts and dry thoroughly.
(2) Inspect for wear, cracks, breaks and other damage. Replace defective parts as necessary.

c. *Installation*. Install bulldozer end bits as illustrated in figure 4-1.

4-3. Bulldozer Cutting Edge

a. *Removal*. Remove bulldozer cutting edge as illustrated in figure 4-1.

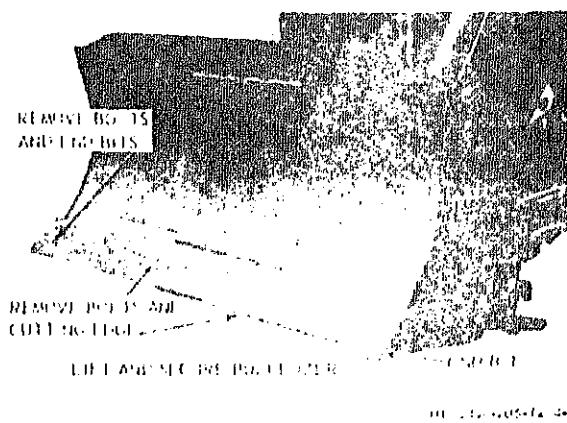


Figure 4-1. Bulldozer cutting edge and end bits, removal and installation.

b. *Cleaning and Inspection*.

(1) Clean all parts and dry thoroughly.
(2) Inspect for wear, cracks, breaks and other damage. Replace defective parts as necessary.

c. *Installation*. Install bulldozer cutting edge as illustrated in figure 4-1.

4-4. Scarifier Tooth

a. *Removal*. Remove scarifier tooth as illustrated in figure 4-2.

b. *Cleaning and Inspection*.

(1) Clean parts and dry thoroughly.
(2) Inspect for wear, cracks, breaks and other damage. Replace defective parts as necessary.

c. *Installation*. Install scarifier tooth as illustrated in figure 4-2.

REMOVE SCARIFIER
TOOTH FROM SHANK

SHANK

REMOVE PIN
AND PIN

NOTE:

REMOVE OTHER
SCARIFIER TEETH IN
A SIMILAR MANNER

ME 2420-206

Figure 4-2. Scarifier tooth, removal and installation.

4-5. Scarifier Body

a. Removal.

(1) Remove scarifier tooth (para 4-4) and shank from body.

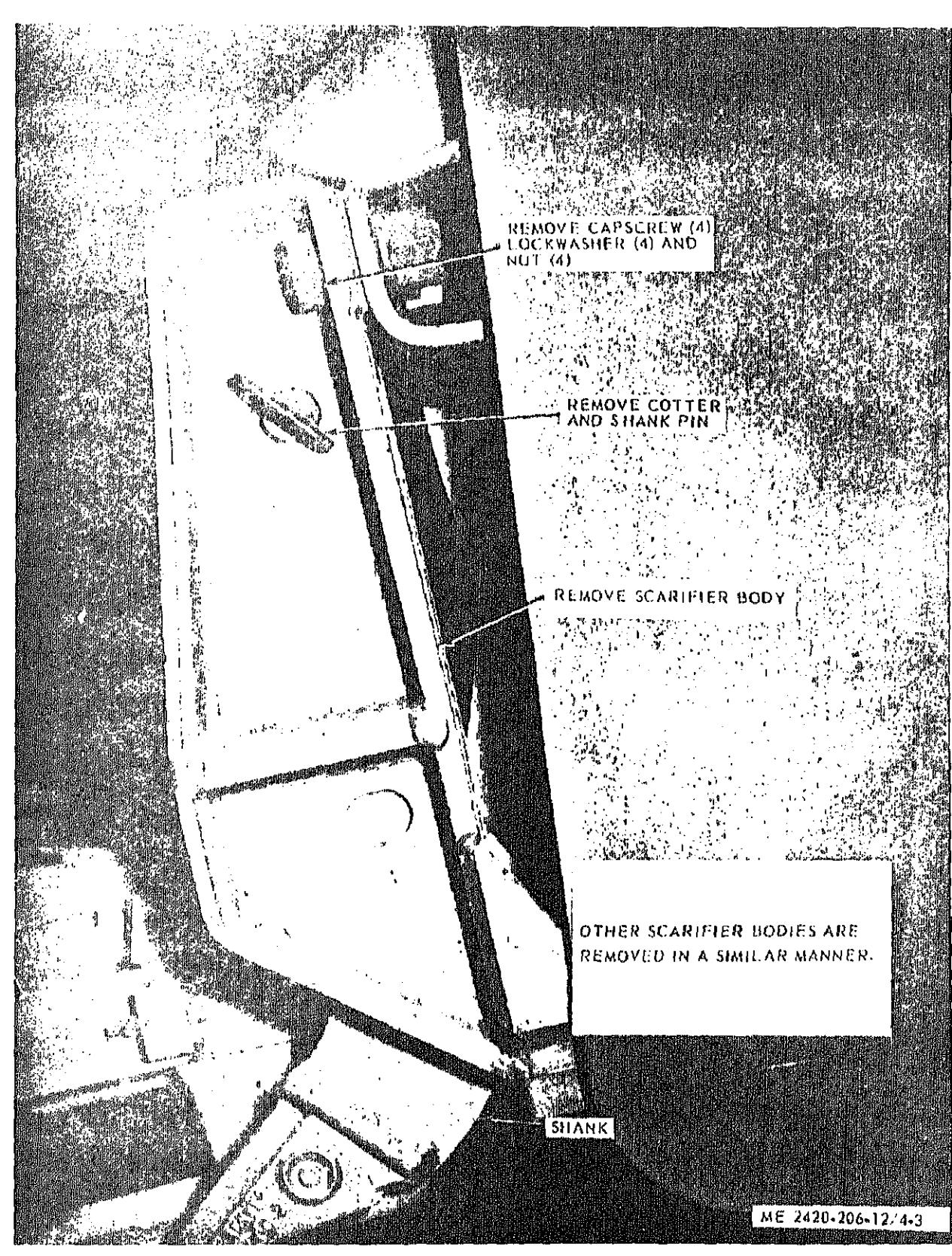
(2) Remove scarifier body as illustrated in figure 4-3.

b. Cleaning and Inspection.

(1) Clean parts and dry thoroughly.

(2) Inspect for wear, cracks, breakage. Replace damaged scarifier body.

c. Installation. Install scarifier body in figure 4-3.



REMOVE CAPSCREW (4)
LOCKWASHER (4) AND
NUT (4)

REMOVE COTTER
AND SHANK PIN

REMOVE SCARIFIER BODY

OTHER SCARIFIER BODIES ARE
REMOVED IN A SIMILAR MANNER.

SHANK

a. Removal. Remove skid shoe as illustrated in figure 4-4.

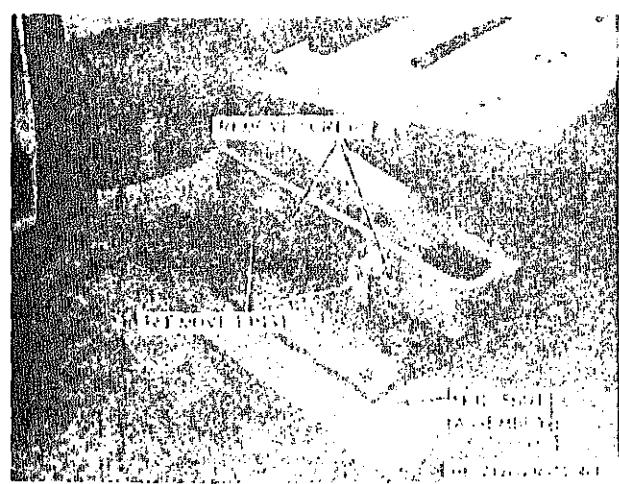


Figure 4-4. Skid shoe, removal and installation.

(1) Clean parts and dry thoroughly.

(2) Inspect for wear, cracks, breaks, and damage. Replace all defective parts.

c. Installation. Install skid shoes as illustrated in figure 4-4.

Note. Skid shoes are installed only when using the blade for grading material.

4-7. Cylinders

a. Removal and Disassembly. Remove and assemble bulldozer lift and tilt cylinders as illustrated in figure 4-5.

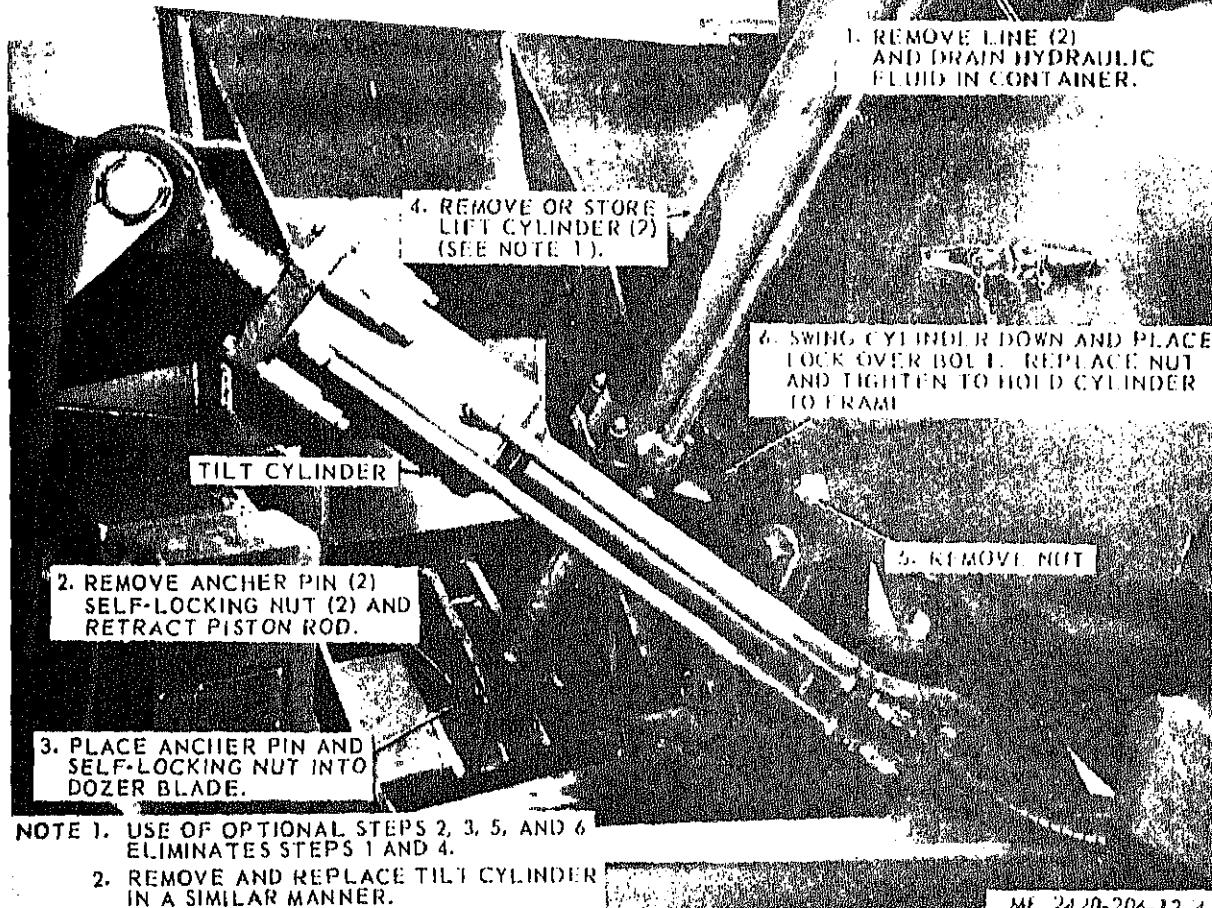
b. Cleaning and Inspection.

(1) Clean parts and dry thoroughly.

(2) Inspect for wear, cracks, breaks and damage. Replace defective parts as necessary. Place wear ring assembly, preformed packing seals.

c. Reassembly and Installation. Reassemble and install bulldozer lift and tilt cylinders as illustrated in figure 4-5. Lubricate interior of cylinderings, and piston.

LOWER BLADE TO GROUND
USE A SUITABLE HOLDING, RAISING,
LOWERING DEVICE TO REMOVE AND INSTALL.



ME 2420-206-12-4

Figure 4-5. Bulldozer lift and tilt cylinder, removal,
disassembly, reassembly, and installation (sheet 1 of 3).

- 1 Nut
- 2 Screw
- 3 Lock
- 4 Cap
- 5 Packing
- 6 Ring
- 7 Pin
- 8 Nut
- 9 Piston
- 10 Ring, packing, seal
- 11 Piston
- 12 Packing
- 13 Wire
- 14 Setscrew
- 15 Retainer
- 16 Wiper
- 17 Gland
- 18 Adapter
- 19 Packing
- 20 Packing
- 21 Adapter
- 22 Rod
- 23 Tube assembly
- 24 Screws
- 25 Bearings (do not remove unless damaged)

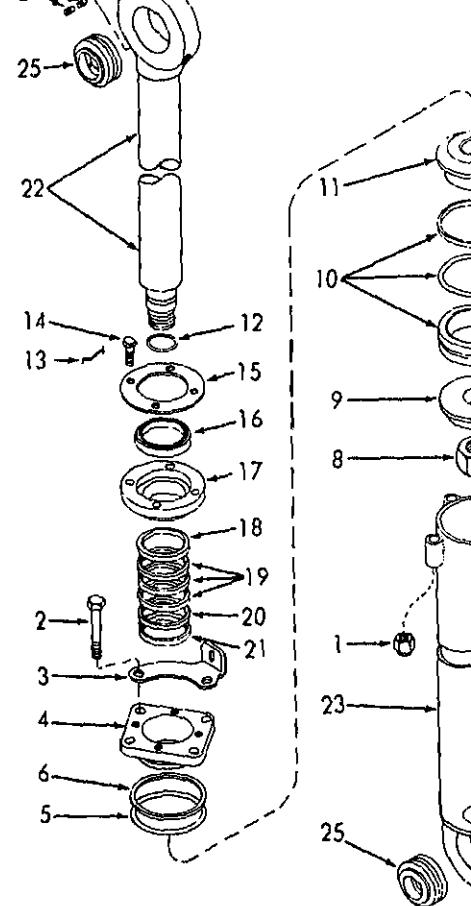
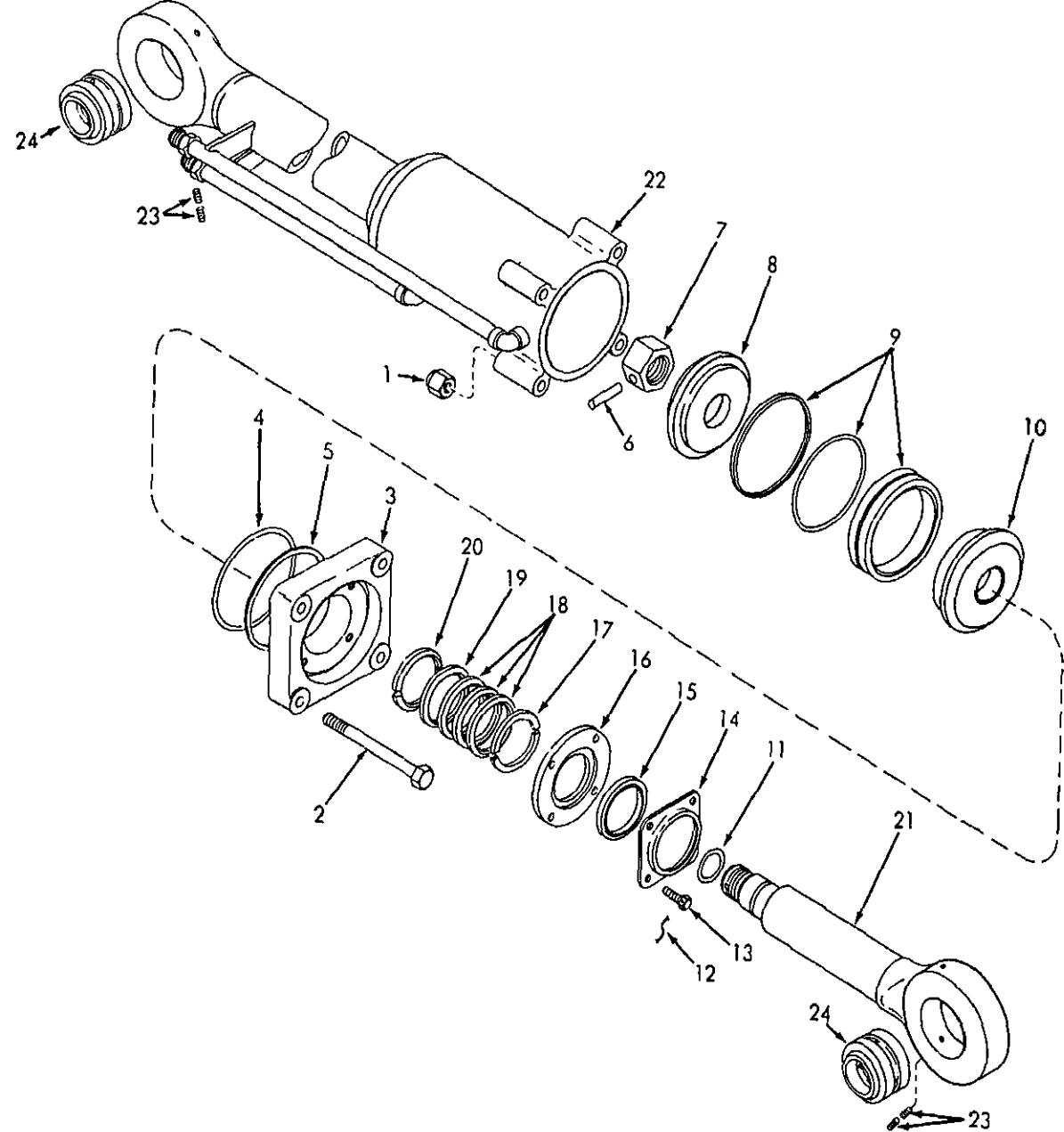


Figure 4-5. Bulldozer lift and tilt cylinder disassembly, reassembly, and installation (s)



ME 2420-206-12/4-5 (3)

1 Nut	13 Screw
2 Screw	14 Retainer
3 Cap	15 Seal
4 Ring	16 Cap
5 Packing	17 Adapter
6 Pin	18 Packing
7 Nut	19 Packing
8 Piston	20 Adapter
9 Seal, packing wear ring	21 Rod
10 Piston	22 Tube assembly
11 Packing	23 Setscrew
12 Wire	24 Bearings (do not remove unless damaged)

pounds, and screws (2) to 50 foot-pounds. Tighten screws (14) finger tight, install lockwire (13).

(2) *Tilt cylinder.* Torque nut (7) to 1,000 foot-pounds, and screws (2) to 320 foot-pounds. Tighten screws (13) finger tight, install lockwire (12).

4-8. Bulldozer Assembly

a. Removal and Disassembly.

(1) Remove cutting edge and end bits (para 4-3).

(2) Remove scarifier body (para 4-5).

(3) Remove skid shoes (para 4-6).

(4) Remove bulldozer cylinders (para 4-7).

(5) Refer to figure 4-6 and remove push beam bearing cap.

dozer blade, push beams, and pitch strut.

b. Cleaning, Inspection, and Repair.

(1) Clean parts and dry thoroughly.

(2) Inspect for wear, cracks, breaks and damage.

(3) Replace defective parts as necessary.

c. Reassembly and Installation.

(1) Refer to figure 4-7 and reassemble dozer blade, push beams, and pitch strut.

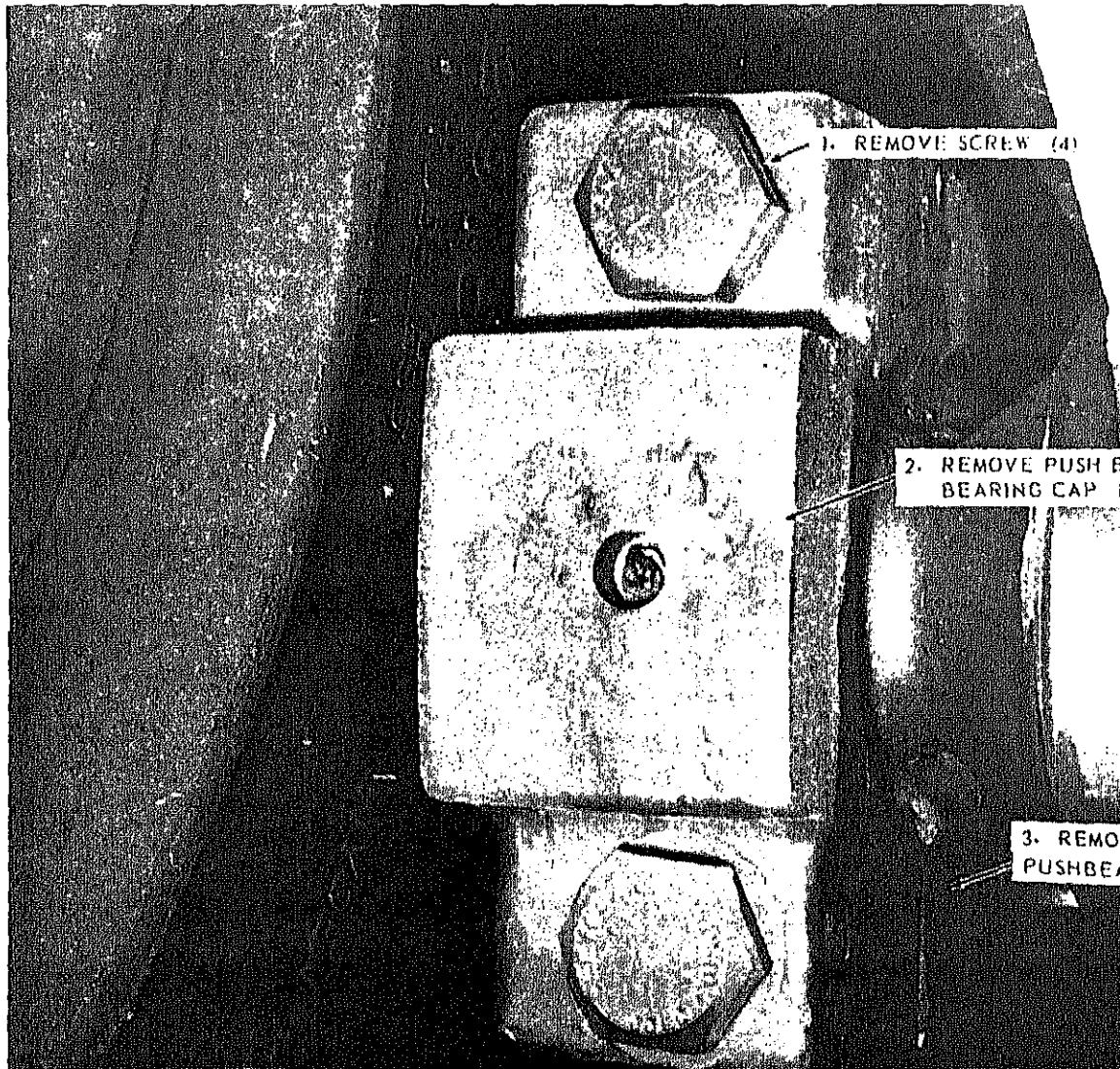
(2) Refer to figure 4-6 and install push bearing cap.

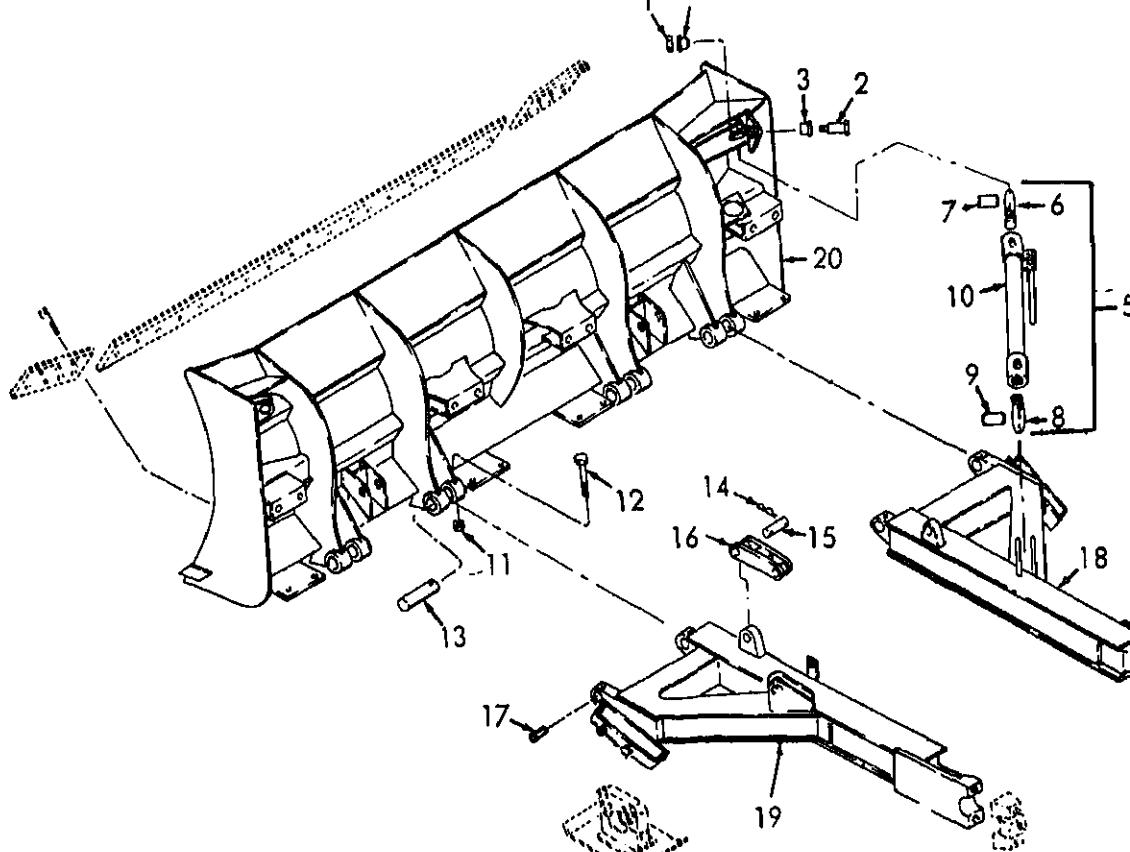
(3) Install bulldozer cylinders (para 4-7).

(4) Install skid shoes (para 4-6).

(5) Install scarifier body (para 4-5).

(6) Install cutting edge and end bits (para 4-3).





NOTE: DO NOT REMOVE ITEMS
3, 4, 7, 9, AND 17 UNLESS DAMAGED.

ME 2420-20

1 Nut	11 Nut
2 Pin	12 Screw
3 Bearing	13 Pin
4 Bearing	14 Pin
5 Pitch strut assembly	15 Pin
6 Rod	16 Lock Link
7 Bearing	17 Bearing
8 Rod	18 Push beam assembly
9 Bearing	19 Push beam assembly
10 Pitch Assembly	20 Blade assembly

Figure 4-7. Bulldozer blade, push beams, and pitch strut, exploded view.

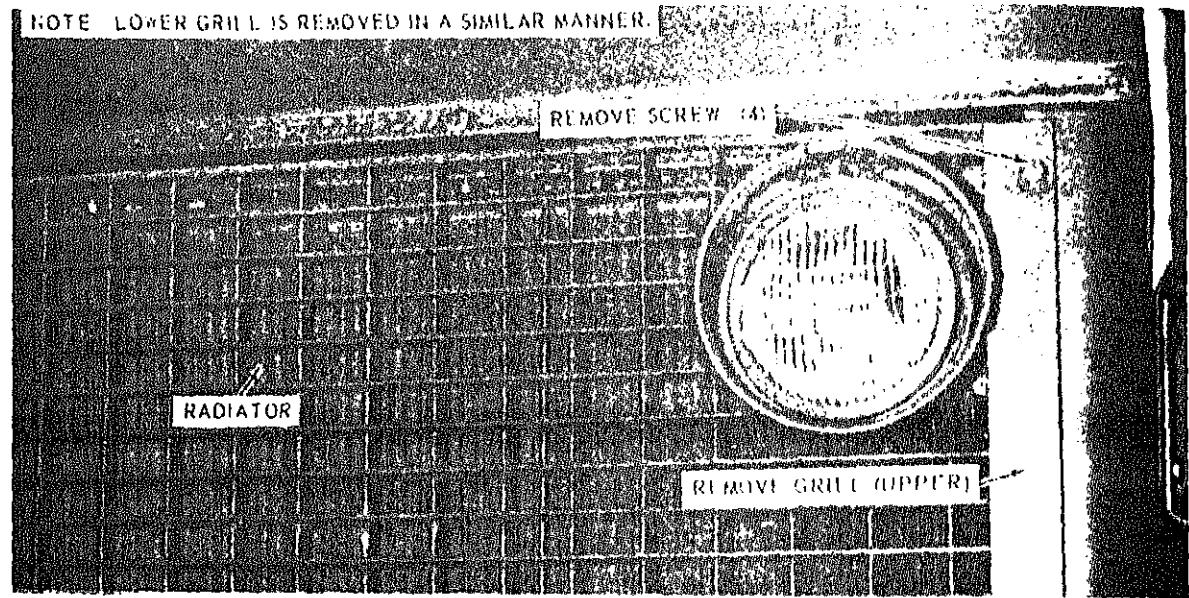
Section II. TRACTOR LIGHTS

4-9. General

Lights mounted on tractor cab and radiator shroud permits 24 hour continuous operation of equipment.

b. Cleaning and Inspection.
 (1) Clean parts and dry thoroughly.
 (2) Inspect for cracks, breaks and damage. Replace defective headlight assembly.

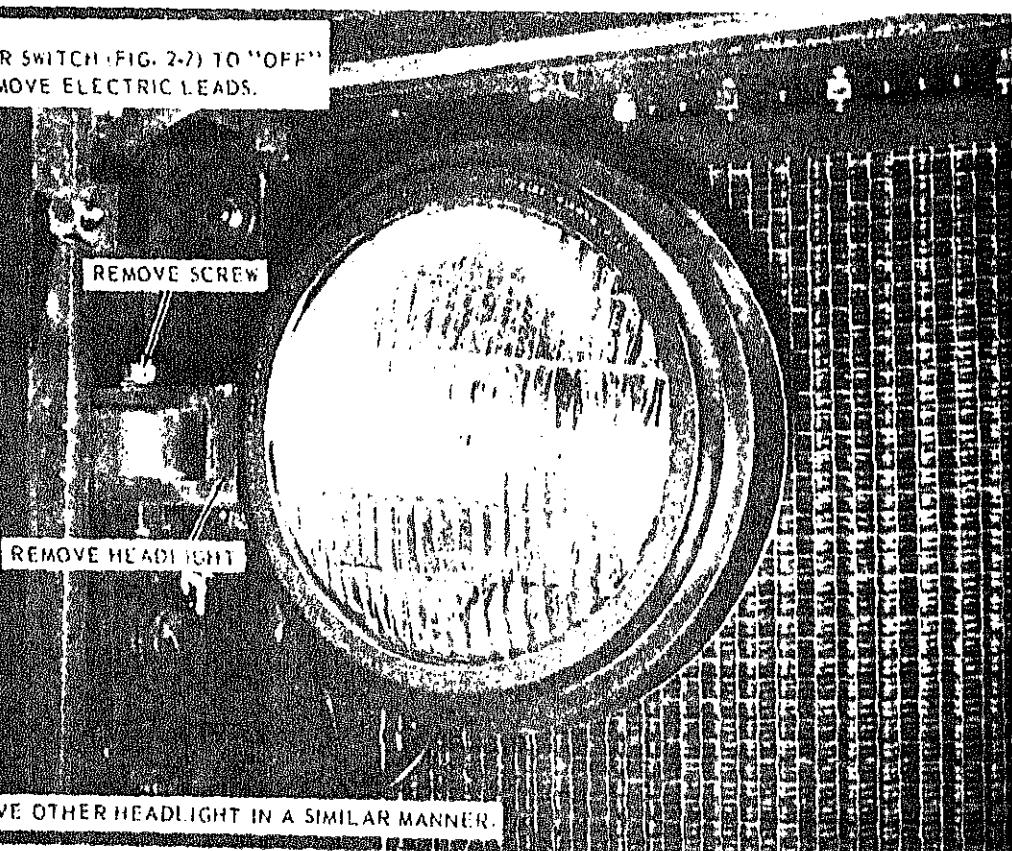
NOTE LOWER GRILL IS REMOVED IN A SIMILAR MANNER.



A. GRILL

NOTE:

MOVE MASTER SWITCH (FIG. 2-7) TO "OFF"
TAG AND REMOVE ELECTRIC LEADS.



NOTE REMOVE OTHER HEADLIGHT IN A SIMILAR MANNER.

B. HEADLIGHT

b. Cleaning and Inspection.

(1) Clean parts and dry thoroughly.

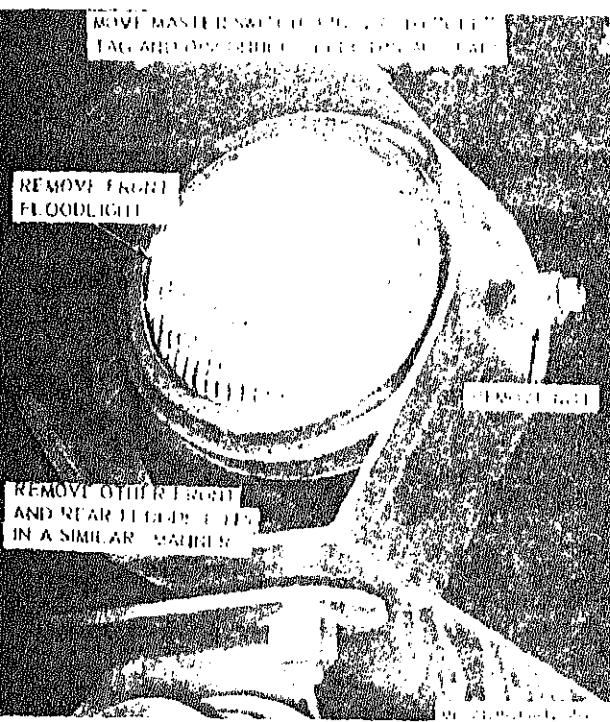


Figure 4-9. Floodlight assembly, removal and installation.

(2) Inspect for cracks, breaks and other damage. Replace defective floodlight assembly and parts as necessary.

c. *Installation.* Refer to figure 4-9 and install floodlight assembly.

12. Blackout Headlight Assembly

a. *Removal.* Refer to figure 4-10 and remove blackout headlight assembly (para 3-15b).

b. Cleaning and Inspection.

(1) Clean parts and dry thoroughly.

(2) Inspect for cracks, breaks and other damage. Replace defective blackout headlight assembly necessary.

c. *Installation.* Refer to figure 4-10 and install blackout headlight assembly.

13. Tail and Stoplight, Blackout Tail and Stoplight Assemblies

a. *Removal.* Refer to figure 4-11 and remove tail and stoplight, blackout tail and stoplight assembly (para 3-15c and 3-15d).

b. Cleaning and Inspection.

(1) Clean parts and dry thoroughly.

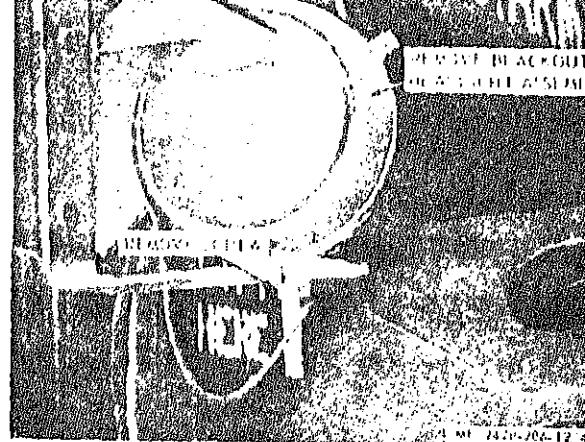


Figure 4-10. Blackout headlight assembly, removal and installation.

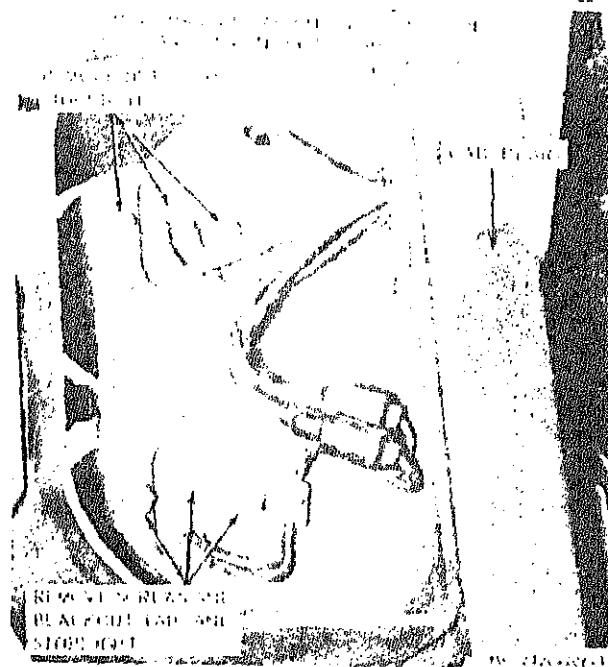
c. *Installation.* Refer to figure 4-11 and install tail and stoplight, blackout tail and stoplight assembly.

4-14. Wiring Harness Repair

a. *General.* Repair of wiring harness pertaining to removal and replacement of a defective single wire in the harness.

b. *Test and Inspection.* Use a multimeter and inspect wiring for continuity and visual defects.

c. *Removal and Repair.* Remove damaged and replace with wire of same size, length and insulation. Install wire using an approved connector.



4-15. General

The engine mounted turbocharger uses an air cleaner and aspirator assemblies that are hood mounted and piped to and from intake manifold, air cleaner and aspirator.

4-16. Aspirator and Exhaust Pipe

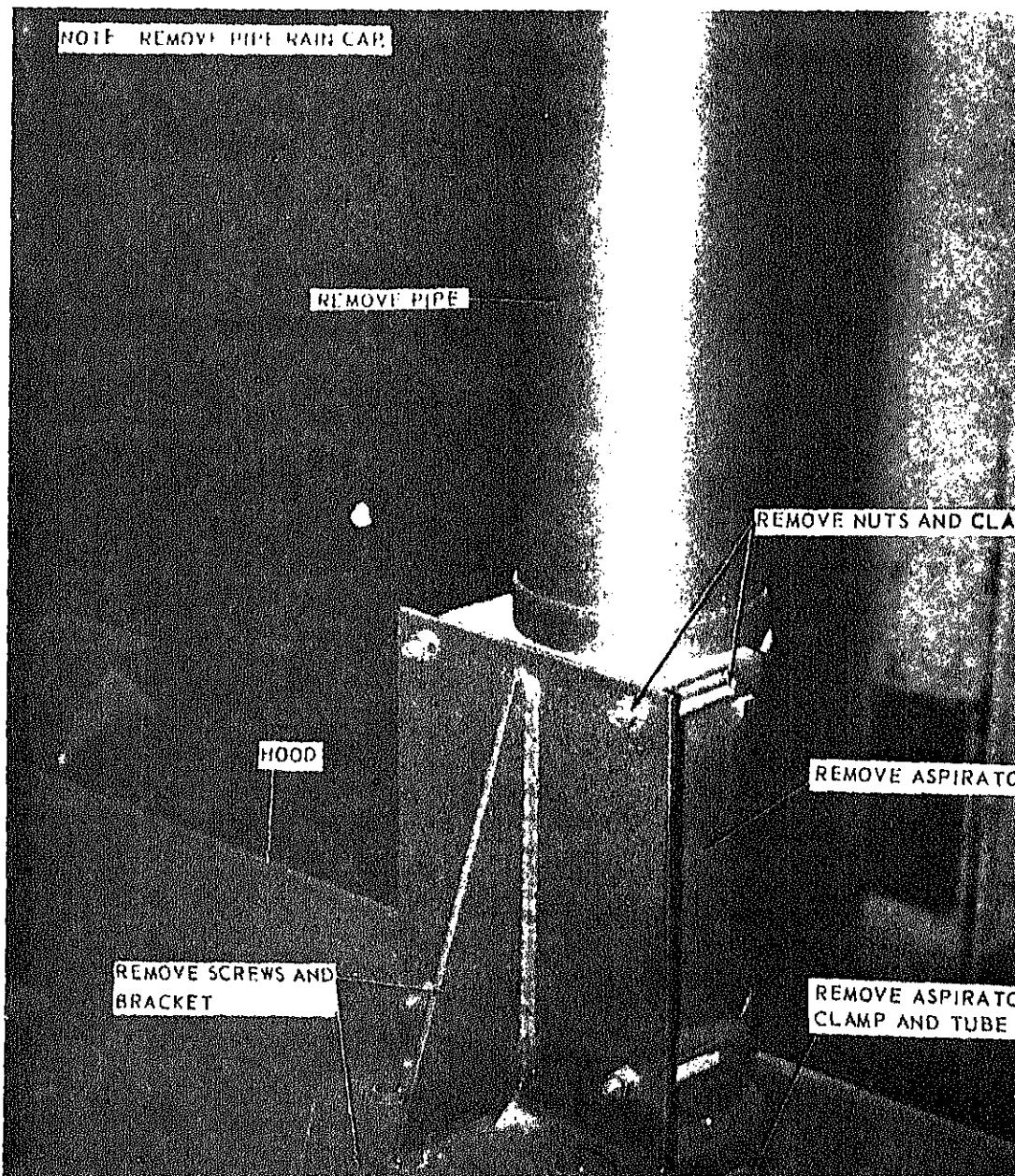
a. **Description.** The aspirator creates a suction

caused by exhaust gases passing through the aspirator. As the gases pass through the aspirator, the air is accelerated causing a decrease in pressure creating a suction pulling dirt particles from the air cleaner.

b. **Removal.** Refer to figure 4-12 and 4-13.

(1) Remove exhaust pipe.

(2) Remove aspirator.



c. Cleaning and Inspection.

- (1) Clean parts and dry thoroughly.
- (2) Inspect parts for cracks, breaks and other damage. Replace defective parts as necessary.

d. Installation. Refer to figure 4-12 and install aspirator and exhaust pipe in reverse order of removal.

17. Air Cleaner, Piping and Hood

a. Description. The air cleaner consists of a precleaner and paper-type filter cartridge which operate together to remove dirt particles from the air before they enter the engine. As air enters precleaner, it passes through deflectors which impart a high speed spin to the air stream. The centrifugal force throws dirt particles outward, out of the air stream before the air enters the filter cartridge, leaving only small particles to become trapped in cartridge. Particles thrown from air stream drop to bottom of precleaner into a self-cleaning dust bin. The bin is cleaned by an air stream created by suction from the aspirator. The cleaned air is pulled into turbocharger and forced into the intake manifold of the engine under pressure. Pressurizing air enables more air to enter engine, which permits more fuel to be burned. This results in greater engine power. A vacuum-operated air system restriction indicator indicates when filter is dirty. The indicator is connected to the side of the air cleaner by a tube.

b. Removal and Disassembly.

- (1) Remove aspirator (para 4-16).
- (2) Remove radiator grill (fig. 4-8).
- (3) Remove and disassemble air cleaner piping and hood as illustrated in figure 4-13. Always cover turbocharger openings when disconnecting turbocharger lines to prevent entry of dirt and foreign objects.

c. Cleaning and Inspection.

- (1) Clean metal parts and dry thoroughly.
- (2) Inspect all items for cracks, breaks, and other damage. Inspect for loose hoses and fittings. Replace defective parts as necessary.

d. Reassembly and Installation.

- (1) Reassemble and install hood and air clean-

4-18. Turbocharger and Manifold

a. Description. The turbocharger forces additional air into engine combustion chambers so engine burns more fuel, enabling engine to develop more horsepower. The turbocharger consists of a turbine wheel and a centrifugal blower, separately encased, but mounted on and rotating with a common shaft. The turbine side of the turbocharger mounts to exhaust manifold outlet flange, and the blower side connects with the air intake manifold. Lubrication is supplied by the engine lubrication system.

b. Impeller Service.

Note. After each 1,000 hours of engine operation perform turbocharger impeller service as contained herein.

- (1) Remove intake air piping items (14, 15, 16) as illustrated in figure 4-13. Remove air intake from turbocharger assembly.

- (2) Remove carbon deposits from intake air impeller and diffuser plate using an appropriate cleaning (non-abrasive) method.

- (3) Using a suitable microinch measuring device, check impeller for end play (max. 0.008 in.).

- (4) Replace turbocharger assembly as necessary. Install intake air piping items (14, 15, 16) as illustrated in figure 4-13.

c. Removal.

- (1) Remove intake air piping items (14, 15, 16) as illustrated in figure 4-13 and exhaust piping items (2 and 3) as illustrated in figure 4-13.

- (2) Remove turbocharger as illustrated in figure 4-14. Cover exhaust port in manifold to prevent entry of dirt into engine.

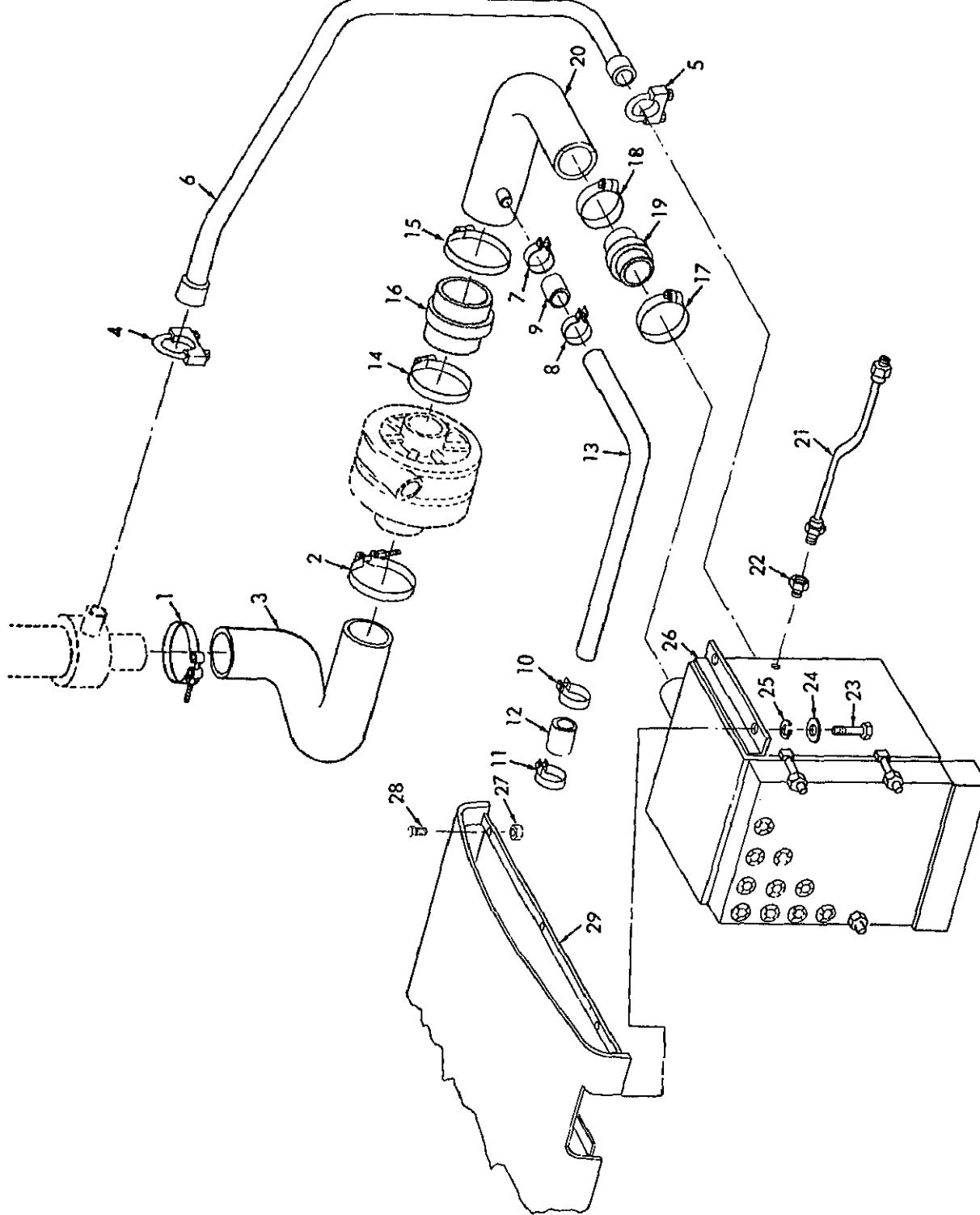
d. Cleaning and Inspection.

- (1) Clean parts and dry thoroughly.
- (2) Inspect for cracks, breaks and other damage. Replace defective turbocharger as necessary.

e. Installation.

- (1) Install turbocharger as illustrated in figure 4-14.
- (2) Install items (2, 3, 14, 15, and 16) as illustrated in figure 4-13.

f. Manifold Inspection. Check for frayed or broken hose, loose hose clamps, damaged



ther assembly

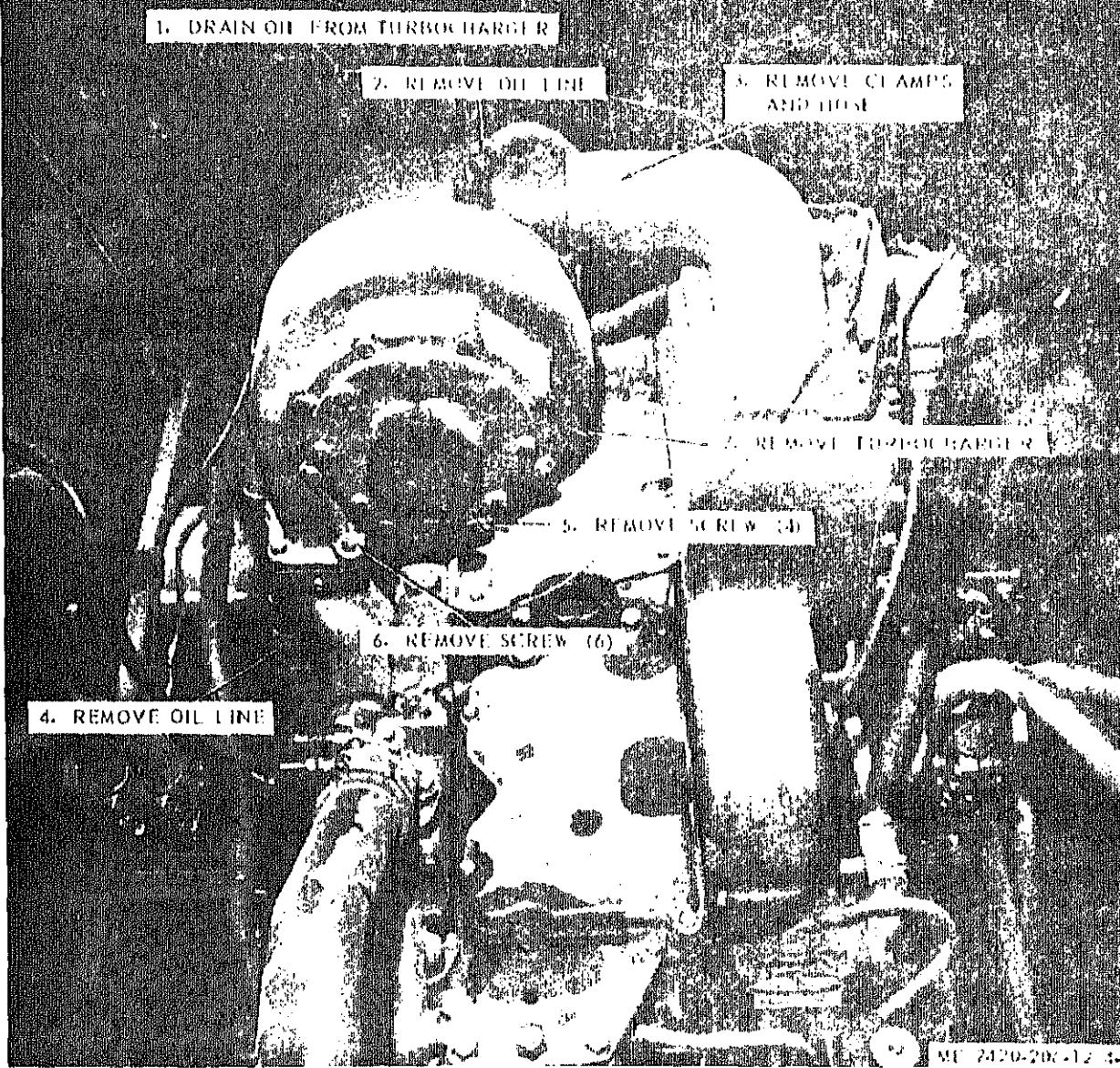


Figure 4-14. Turbocharger, removal and installation.

Section IV. CONTROLS AND INSTRUMENTS

4-19. General

a. Instruments and controls are mounted on sheet metal panels and installed on right and left side of the tractor dash panel. Air lines, oil lines, electrical wiring, and speed cables are attached to applicable

4-20. Controls and Instruments

a. Removal.

(1) *Master switch.* Move master switch (2-7) to OFF position. Tag controls and instruments, piping, wiring, and cables, remove

crews securing circuit breaker to dash panel.

(b) Inspect and test.

1. Inspect for loose terminals or cracked insulator case.

2. Connect each circuit breaker in series with a 24-volt DC power source and a test lamp. Short across terminals of test lamp after lamp is lit. The circuit breaker should open the circuit and the lamp should not light when short is removed. The circuit breaker should close the circuit again and light test lamp after a short time has elapsed. Replace a defective circuit breaker.

(3) Instrument panel.

(a) Remove screws securing instrument panel to dash panel and remove instrument panel from dash panel.

(b) Inspect for cracks, breaks and other damage. Replace as necessary.

(4) Starting aid. Remove starting aid as

illustrated in figures 2-12 and 4-18.

b. Cleaning and Inspection.

(1) Clean lines, cables and wires.

(2) Inspect lines and fittings for breaks, cracks and other damage. Inspect cables for damage and defects. Inspect wiring for defects. Replace defective lines, fittings and cables as necessary. Repair or replace wiring as necessary. Refer to figure 1-1. Replace all preformed packings, gaskets and all defective parts of the starting aid.

c. Installation.

(1) Install starting aid as illustrated in figure 4-15.

(2) Install instrument panel on dash panel.

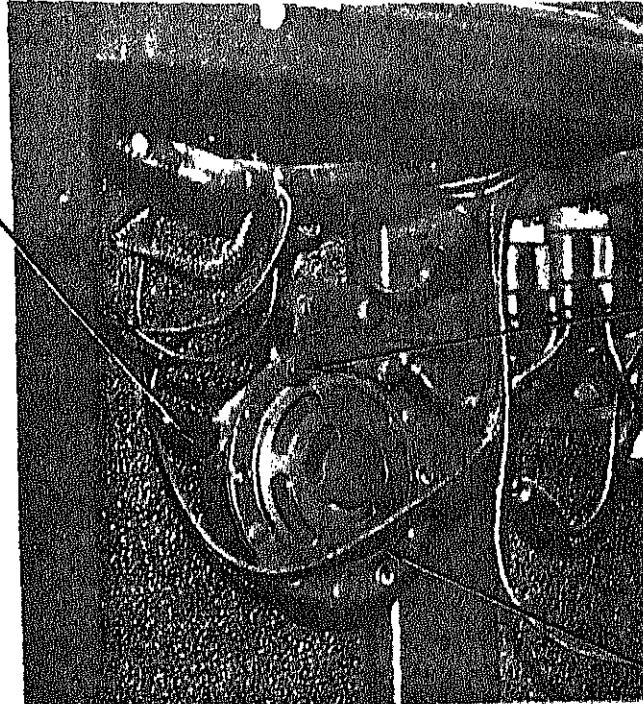
(3) Install circuit breakers on dash panel.

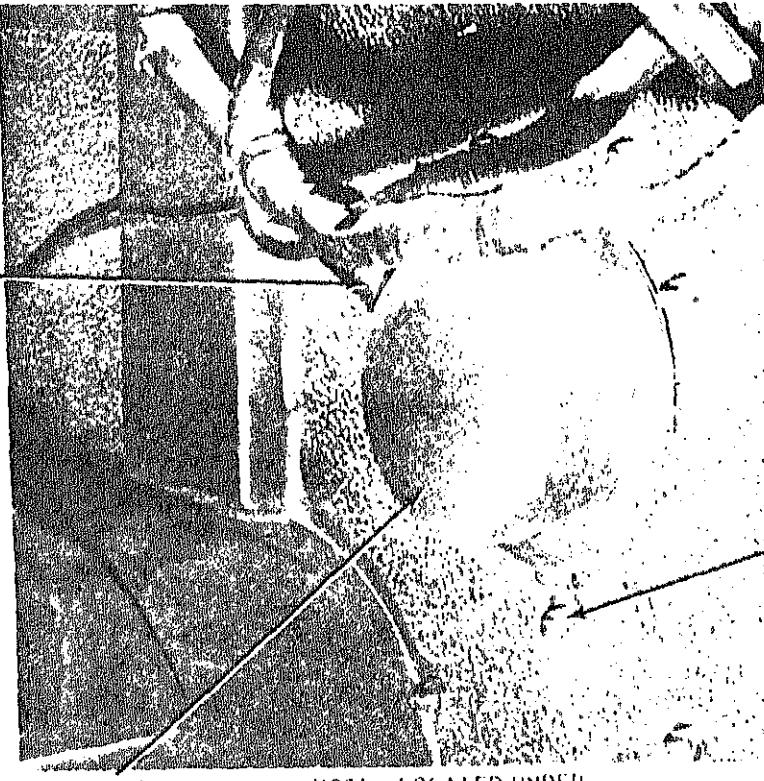
(4) Install instruments and controls in reverse order of removal, figure 4-15. Do not break or kink capillary tubing.

TAG AND REMOVE
ELECTRICAL LEAD.

REMOVE SCREWS

REMOVE OVERSPEED
WARNING HORN





TAG AND
REMOVE
ELECTRICAL
LEAD

REMOVE LOW AIR PRESSURE
WARNING BUZZER

NOTE: LOCATED UNDER
INSTRUMENT PANEL.

REMOVE SCREW (3)

MF 2420-206-12 4-15 '21

*Figure 4-15. Controls and instruments, removal and installation,
(sheet 2 of 10).*

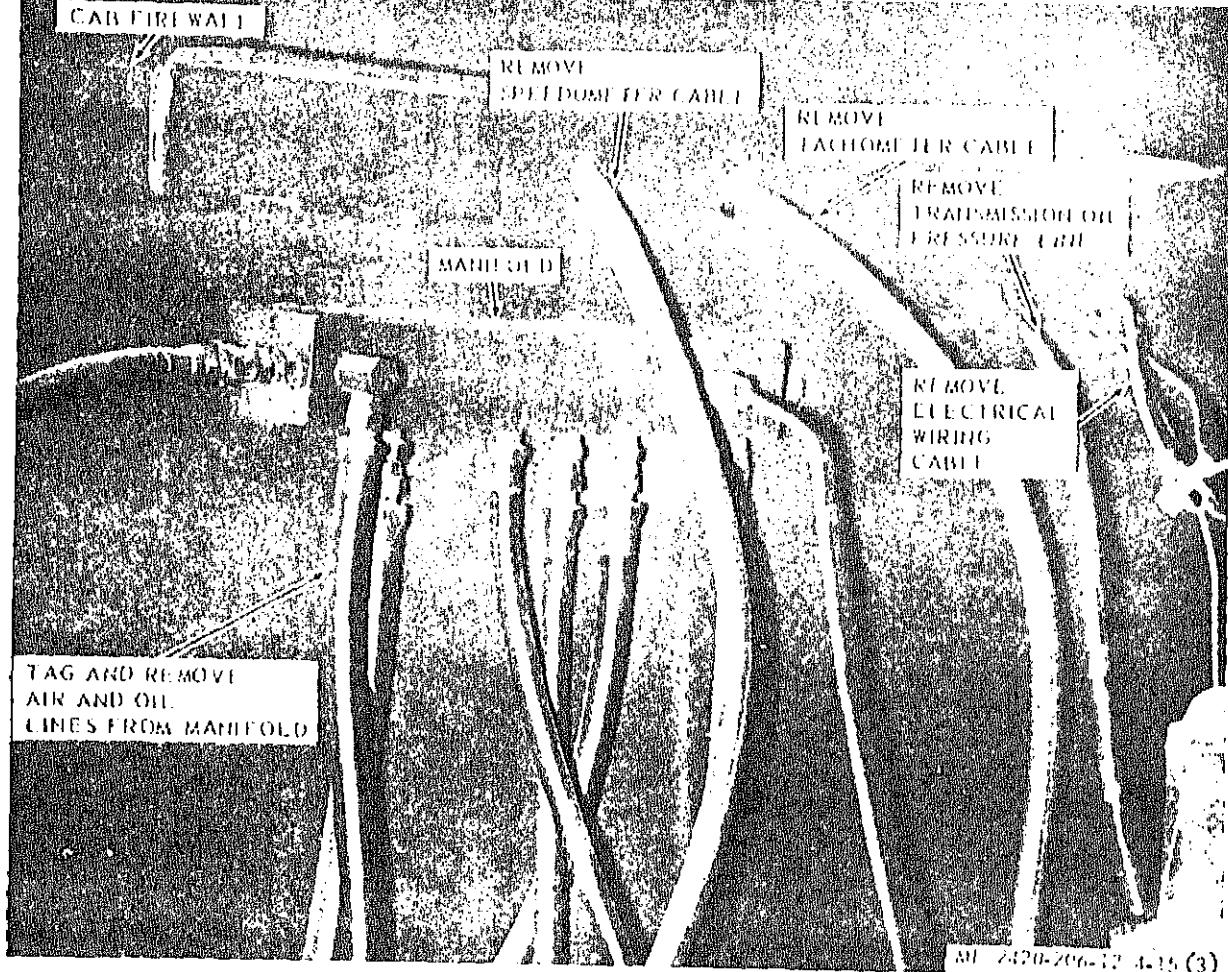


Figure 4-15. Controls and instruments, removal and installation,
(sheet 3 of 10).

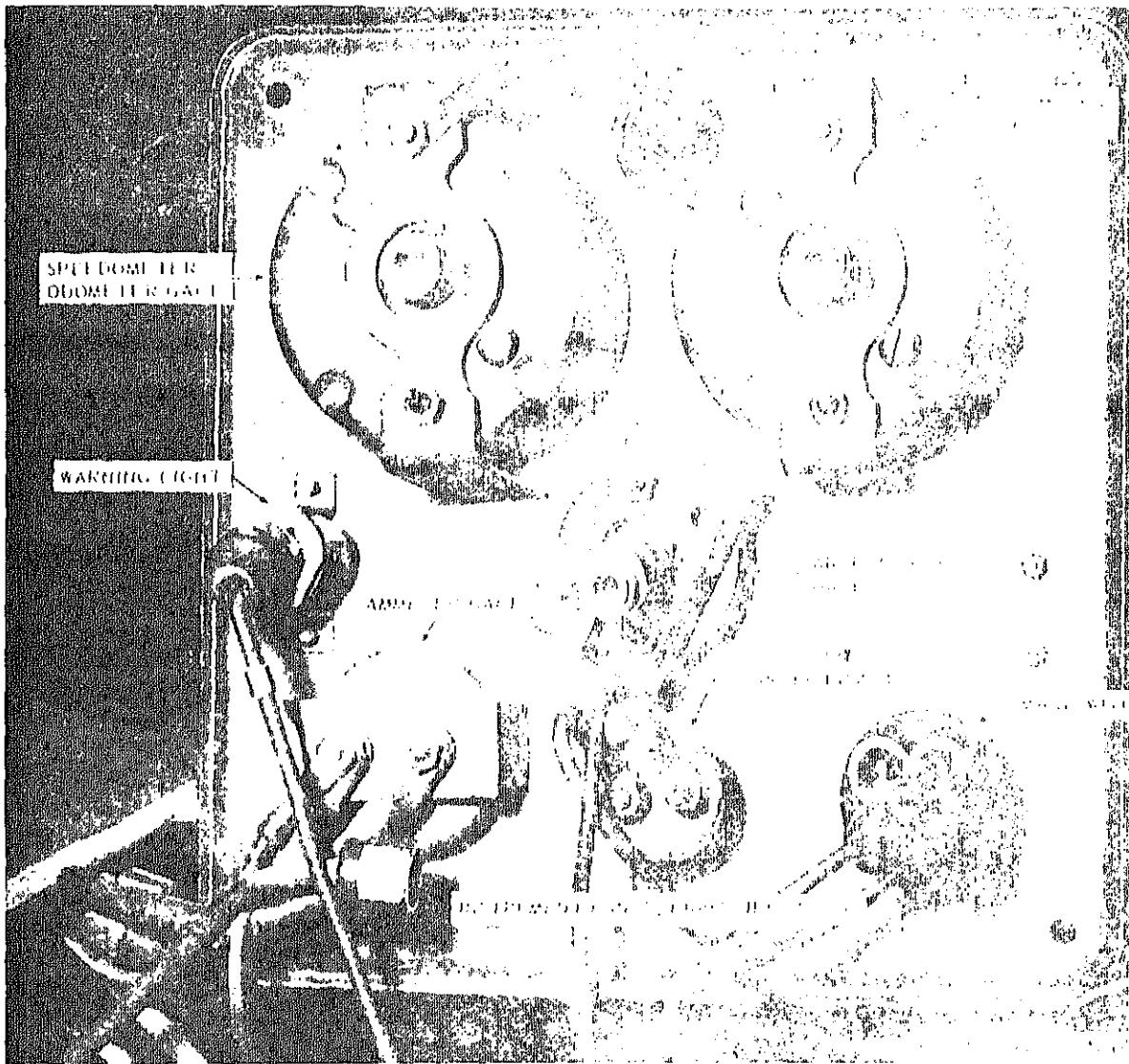


Figure 4-15. Controls and instruments, removal and installation,
(sheet 4 of 10).



Figure 4-15. Controls and instruments, removal and installation,
(sheet 5 of 10).

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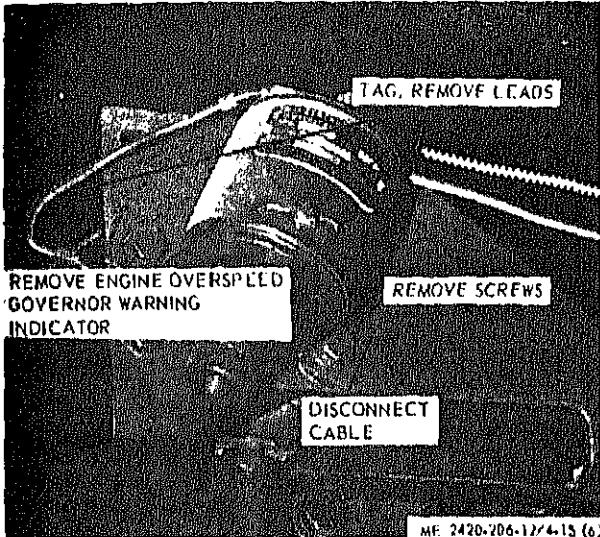


Figure 4-15. Controls and instruments, removal and installation, (sheet 6 of 10).

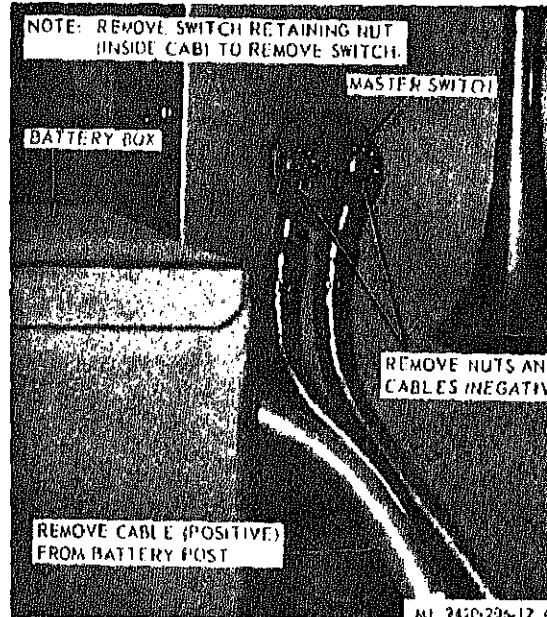
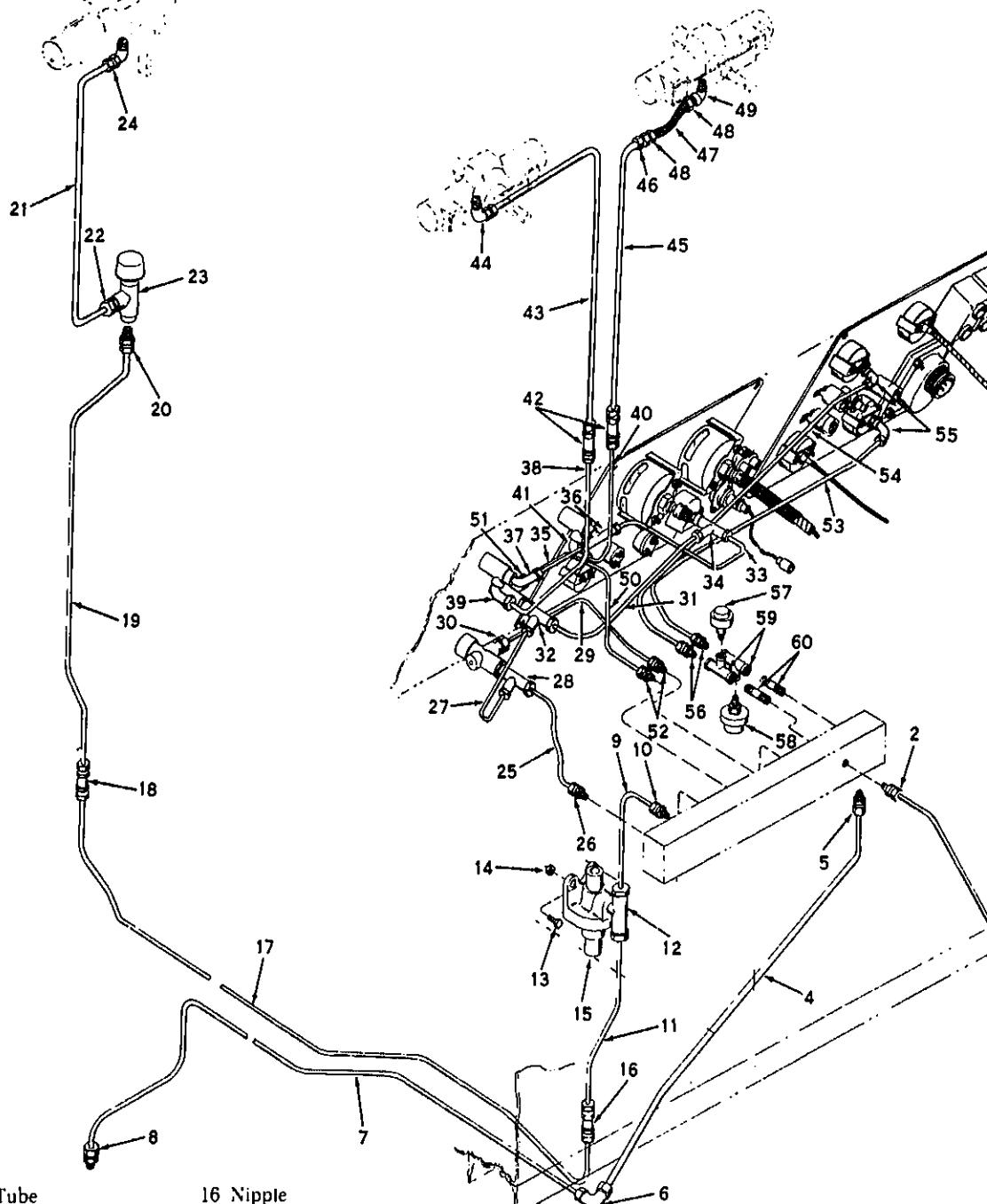
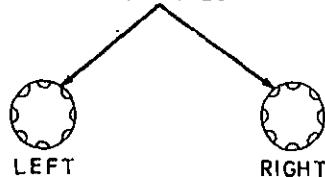


Figure 4-15. Controls and instruments, removal and installation, (sheet 7 of 10).

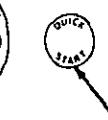


1	Tube	16	Nipple	6	
2	Adapter	17	Tube		ME 2420-206-12/4
3	Adapter	18	Nipple		
4	Tube	19	Tube		
5	Adapter	20	Adapter		
6	Elbow	21	Tube	41	Elbow
7	Tube	22	Adapter	42	Nipple
8	Adapter	23	Switch assembly	43	Tube
9	Tube	24	Elbow	44	Elbow
10	Adapter	25	Tube	45	Tube
11	Tube	26	Adapter	46	Adapter
12	Tee	27	Tube	47	Hose
13	Screw	28	Tee	48	Fitting
14	Washer	29	Tube	51	Adapter
15	Washer	30	Tube	52	Adapter
		31	Tube	53	Tube
		32	Tee	54	Tube
		33	Tube	55	Elbow
		34	Tee	56	Adapter
		35	Tube	57	Switch
		36	Tee	58	Switch

FRONT WINDSHIELD WIPER
MOTOR CONTROLS



AIR RESERVOIR
MOISTURE VALVE
DRAIN CONTROL



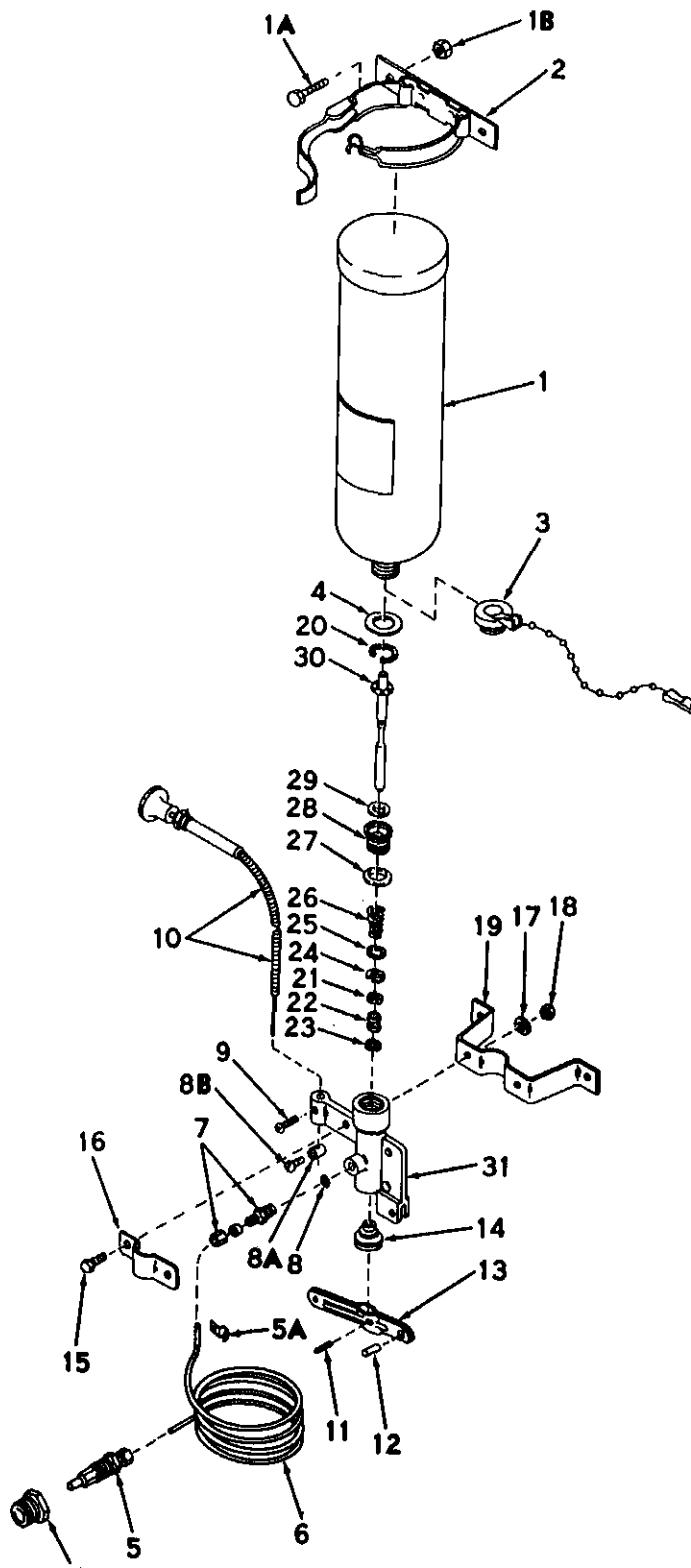
ENGINE QUICK START
(ETHER AID) CONTROL
(SEE FIG. 4-15 ⑩)

TRACTOR-TRAILER
OPERATING PROTECTION
CONTROL LEVER
(NORMALLY IN NORMAL
POSITION)

ME 2420-206-12/4-15 ⑨

*Figure 4-15. Controls and instruments, removal and installation,
(sheet 9 of 10).*

1 Fuel cylinder
 1A Capscrew
 1B Self-locking nut
 2 Clamp and bracket
 3 Chain cap
 4 Gasket
 5 Manifold fitting
 5A Clip
 6 Tube
 7 Adapter
 8 Screen
 8A Throttle stop
 8B Machine screw
 9 Machine screw
 10 Choke cable
 11 Roll pin
 12 Hinge pin
 13 Lever
 14 Plug
 15 Capscrew
 16 Identification plate
 17 Washer
 18 Nut
 19 Bracket
 20 Retaining ring
 21 Preformed packing
 22 Separator
 23 Preformed packing
 24 Retaining ring
 25 Washer
 26 Spring
 27 Preformed packing
 28 Guide
 29 Preformed packing
 30 Pusher pin
 31 Body
 32 Bushing



4-21. Steering Wheel, Trailer Brake Control and Drag Link Adjustment

a. *Removal.* Remove steering wheel and trailer brake control as illustrated in figure 4-16. Remove screws (9) from retainer (10), pry simultaneously with two small screwdrivers on opposite edges of

retainer to remove. Remove cap (11), horn button (12), insulator (13), spring (14), and contact (15). Remove nut (16) from steering gear assembly (17) and use a puller to pull steering wheel (18) move key (18).

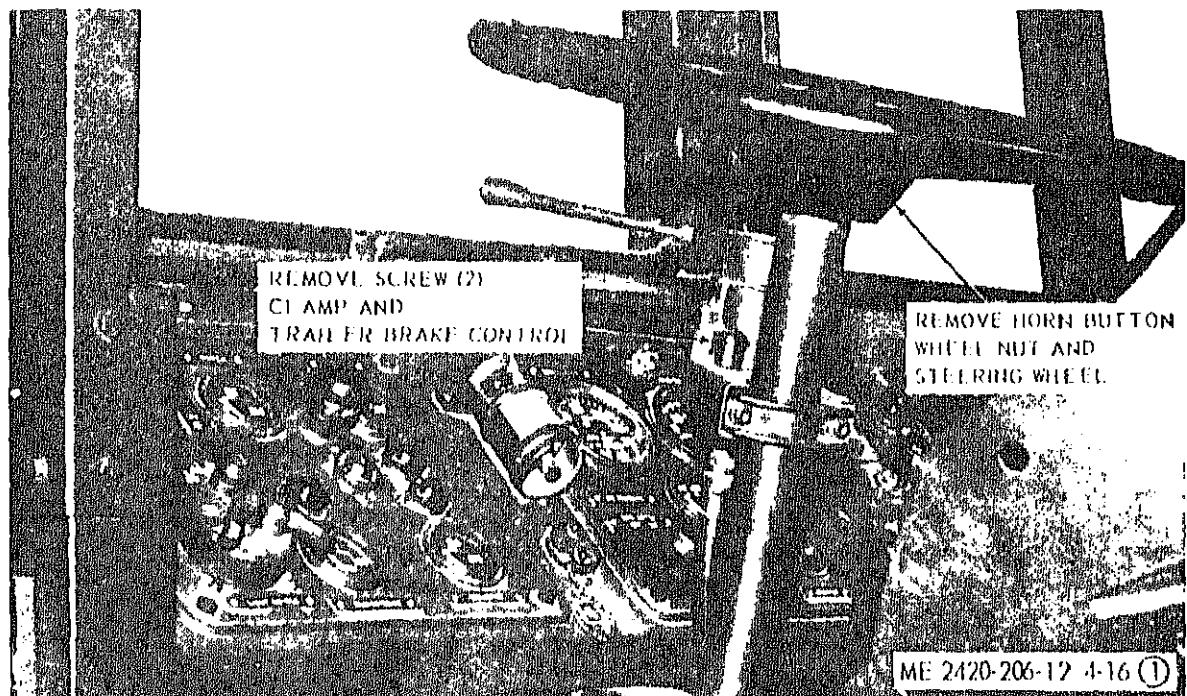


Figure 4-16. Steering wheel, trailer brake control, removal and installation. (sheet 1 of 2).

b. Cleaning and Inspection.

(1) Clean parts and dry thoroughly.

(2) Inspect for cracks, breaks and other damage. Replace defective parts as necessary.

c. *Installation.* Install steering wheel and trailer brake control in reverse order of removal, figure 4-16.

d. Drag Link Adjustment.

(1) Park tractor in a straight direction.

(2) Remove floorplate beside steering column. Remove nut (2) that secures ball stud (4) of the drag link to the pitman arm (21) of steering gear (22). Disengage ball stud from pitman arm.

(3) With engine off, turn steering wheel gently until it stops at its limit of rotation in either

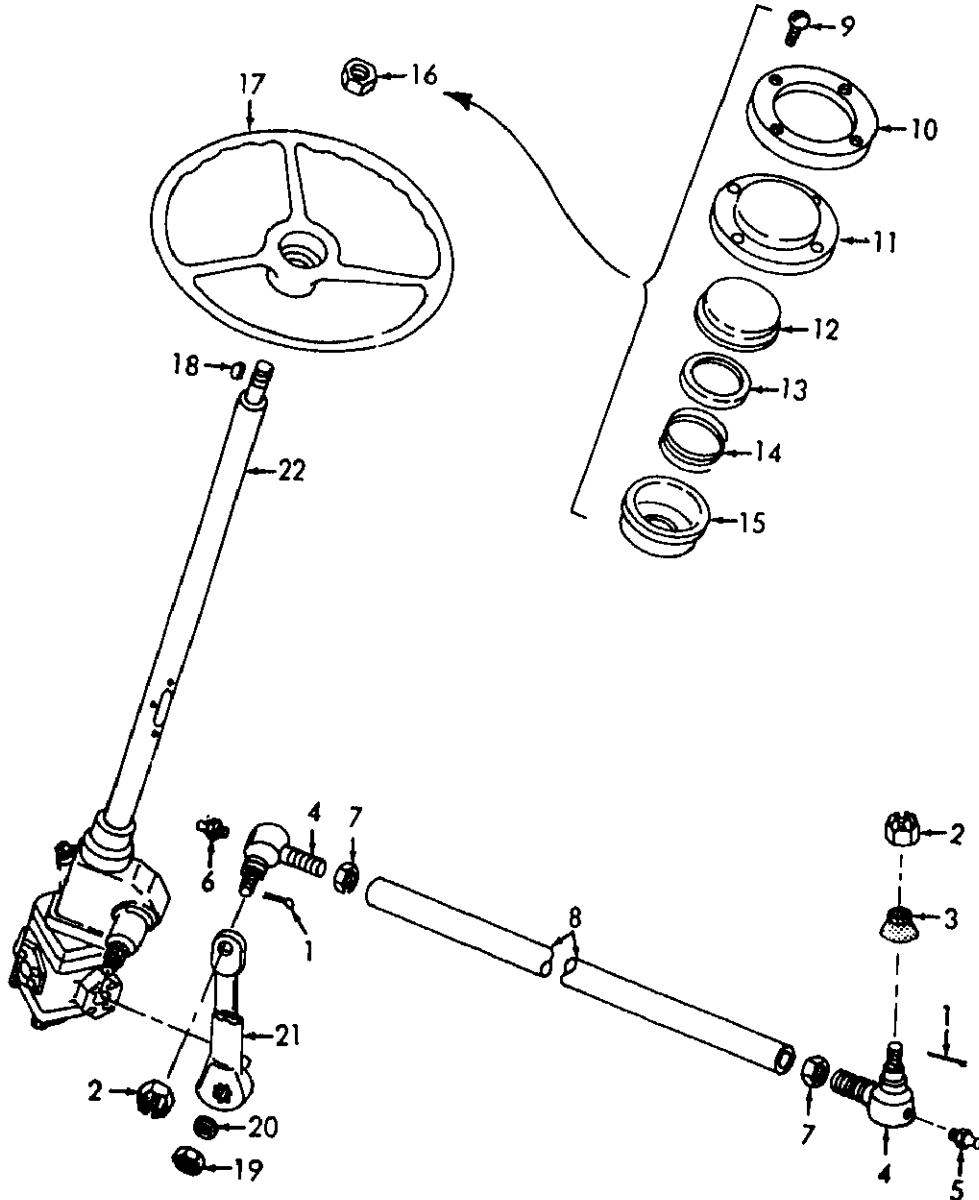
limit of travel in the opposite direction.

(4) When total wheel travel is determined divide this number by two. Turn wheel back toward midposition until it is centered.

(5) Check position of ball stud (4) to mounting hole on pitman arm. If it is not aligned, loosen locknut (7) that locks ball joint to drag link tube (8) and turn ball stud in or out of tube until it is aligned.

(6) If alignment cannot be made by adjustment of the positions of ball studs, remove nut (19) and washer (20) and pull pitman arm (21) from steering gear shaft. Reposition pitman arm on the shaft to permit proper adjustment of drag link.

(7) Tighten all locknuts (7) after making



ME 2420-206-12/4-16 (2)

1 Cotter pin	12 Horn button
2 Nut	13 Insulator
3 Rubber boot	14 Spring
4 Ball stud	15 Contact
5 Lubrication fitting	16 Nut
6 Lubrication fitting	17 Steering wheel
7 Locknut	18 Key
8 Drag link tube	19 Nut
9 Machine screw	20 Washer
10 Retainer	21 Pitman arm
11 Cap	22 Steering gear

Figure 4-16. Steering wheel, trailer brake control, removal and

22. Bulldozer Control Levers

a. Removal and Disassembly.

(1) Remove floorplate and boot from lever. Remove rear rock guard (fig. 4-46).

(2) Remove and disassemble bulldozer control levers as illustrated in figure 4-17.

b. Cleaning and Inspection.

(1) Clean all parts and dry thoroughly.

(2) Inspect all parts for cracks, breaks and other damage. Replace defective parts as necessary.

c. Reassembly and Installation.

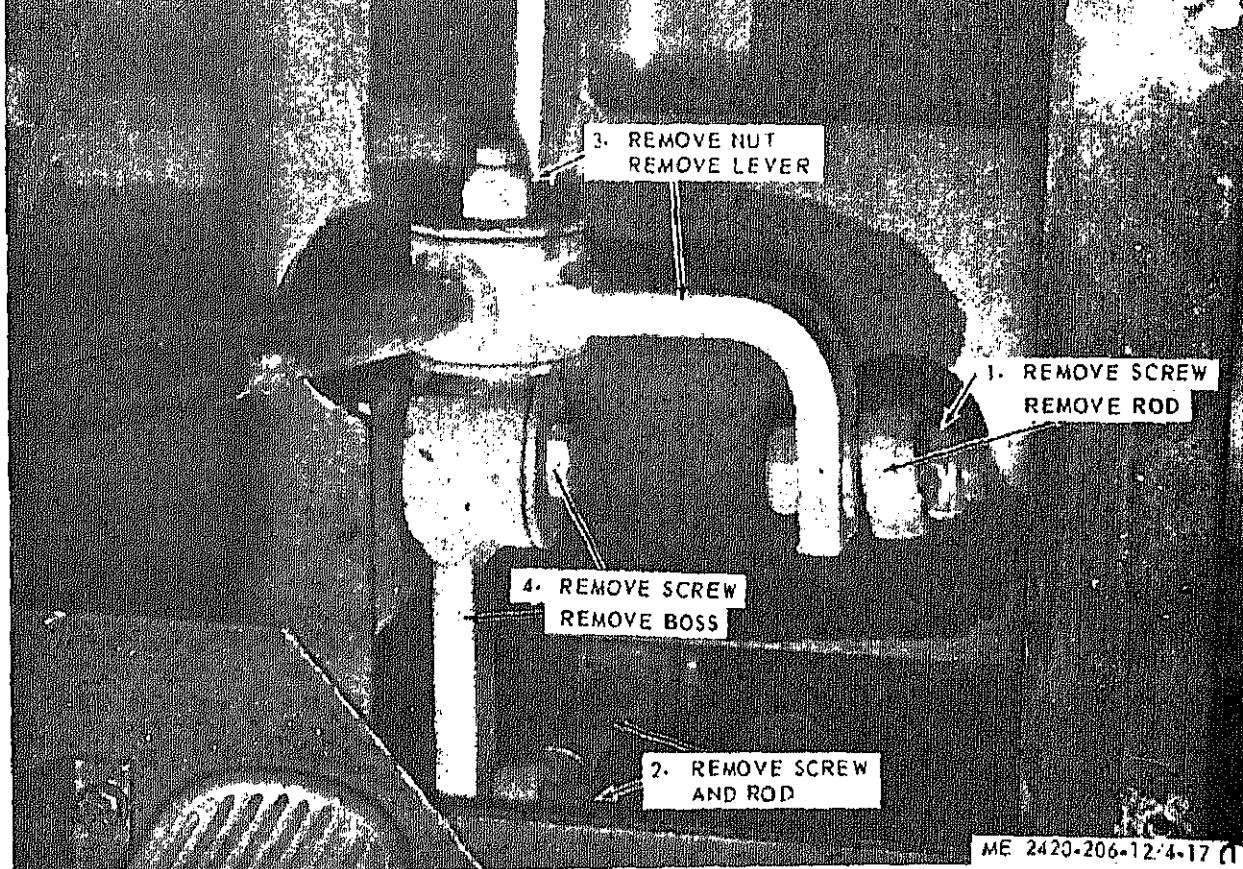
(1) Reassemble and install bulldozer control levers as illustrated in figure 4-17.

(2) Adjustment.

(a) To adjust bulldozer control lever line so control lever is farther to front when in neutral position, screw rod end (21) farther onto rod (15). For adjusting to rear reverse above procedure.

(b) To adjust bulldozer control lever line so control lever is farther to the right when in neutral position, screw rod end (14) farther onto rod (15). For adjusting to left, reverse above procedure.

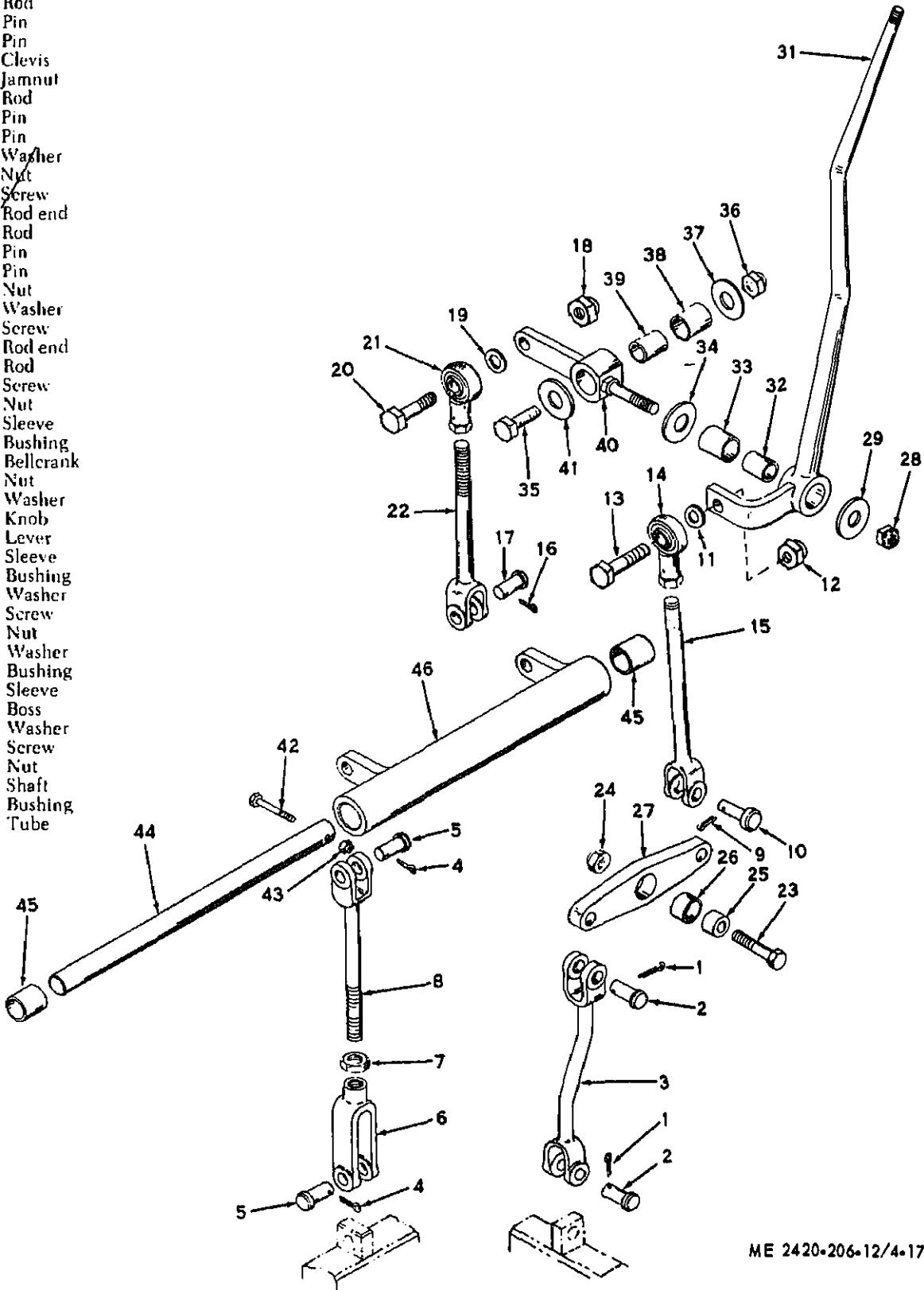
(3) Install rear rock guard (fig. 4-46) and floorplate.



ME 2420-206-12-4-17

Figure 4-17. Bulldozer control lever, removal, disassembly, reassembly and installation (sheet 1 of 2).

3 Rod
 4 Pin
 5 Pin
 6 Clevis
 7 Jamnut
 8 Rod
 9 Pin
 10 Pin
 11 Washer
 12 Nut
 13 Screw
 14 Rod end
 15 Rod
 16 Pin
 17 Pin
 18 Nut
 19 Washer
 20 Screw
 21 Rod end
 22 Rod
 23 Screw
 24 Nut
 25 Sleeve
 26 Bushing
 27 Bellcrank
 28 Nut
 29 Washer
 30 Knob
 31 Lever
 32 Sleeve
 33 Bushing
 34 Washer
 35 Screw
 36 Nut
 37 Washer
 38 Bushing
 39 Sleeve
 40 Boss
 41 Washer
 42 Screw
 43 Nut
 44 Shaft
 45 Bushing
 46 Tube



23. Transmission Control Levers

a. Removal and Disassembly.

- (1) Remove floorplates.
- (2) Remove and disassemble transmission control levers as illustrated in figure 4-18.

b. Cleaning and Inspection.

- (1) Clean parts and dry thoroughly.
- (2) Inspect for cracks, breaks and other damage. Replace defective parts as necessary.

c. Reassembly and Installation.

- (1) Reassemble and install transmission control levers as illustrated in figure 4-18.

(2) The speed and direction settings of spools transmission control valve must coincide with numbers on shift cover. Adjust as follows:

(a) With transmission shift lever (50) in N (neutral) position, check that lever is centered in neutral position slot on shift cover (20). To move lever toward operator's position, loosen jamnut (4) and turn to disconnect the direction shift clevis rod (6) from transmission control valve spool. Turn clevis rod into clevis (3) to shorten the linkage. To move lever away from operator's position, reverse above procedure. Tighten jamnut and reconnect clevis rod with clevis pin (2) and cotter pin (1).

(b) After adjustment, shift lever to forward and reverse positions to make sure the shift lever is centered in speed range slots on shift cover.

(c) Make sure the speed range spool of trans-

mission control valve is detented in first speed position when lever is shifted to that position. If lever is not properly aligned with number 1 on cover, adjust length of speed control linkage. Move lever farther forward, loosen jamnut (4), disconnect speed shift clevis rod (5) from speed transmission control valve. Turn clevis rod in to shorten linkage. To move lever farther toward rear, turn clevis rod out of clevis to lengthen linkage. Connect with clevis pin (2) and cotter pin (1).

(d) Move shift lever to the fourth speed forward position. Make sure spool is detented in fourth speed position and lever is aligned with number 4 on shift cover (20). Readjust if necessary.

(e) Move transmission shift lever to N position. Apply parking brake. When brake is applied, brake and shift interlock lever (16) must engage notch in direction shift bellcrank (57). If it does not, adjust position of cable spring anchor (10) and parking brake cable so interlock lever does engage bellcrank. With transmission cover valve spool in neutral, if interlock lever (16) does not engage bellcrank, adjust effective lengths of the direction shift rod (39) and direction shift clevis rod (6) as necessary. When adjusted, the spring (7) should be under moderate tension. Release the brake. Check distance between top of cable spring anchor and underside of floorplate. It should be approximately 1 7/8 inches.

(3) Install floorplate.

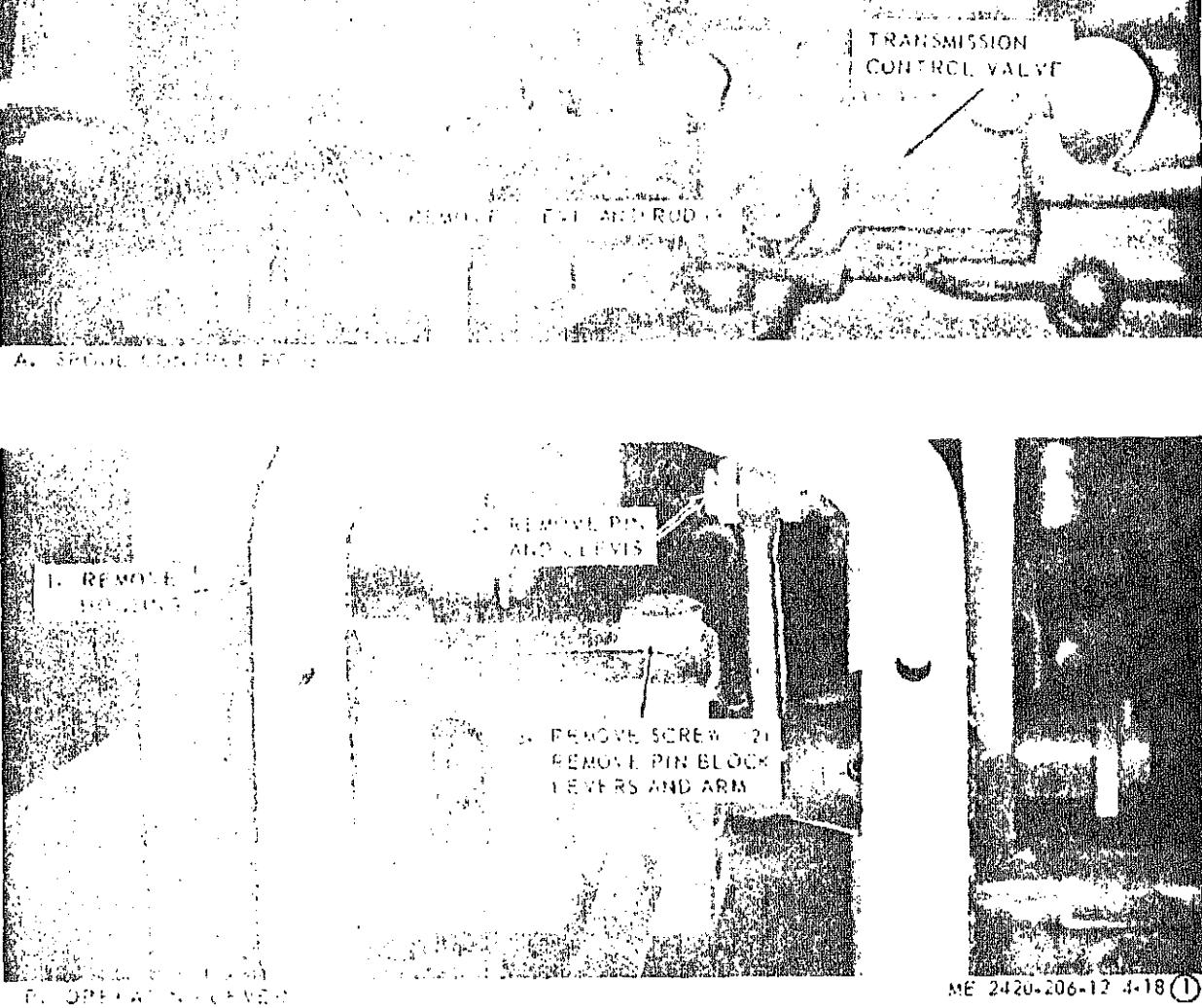
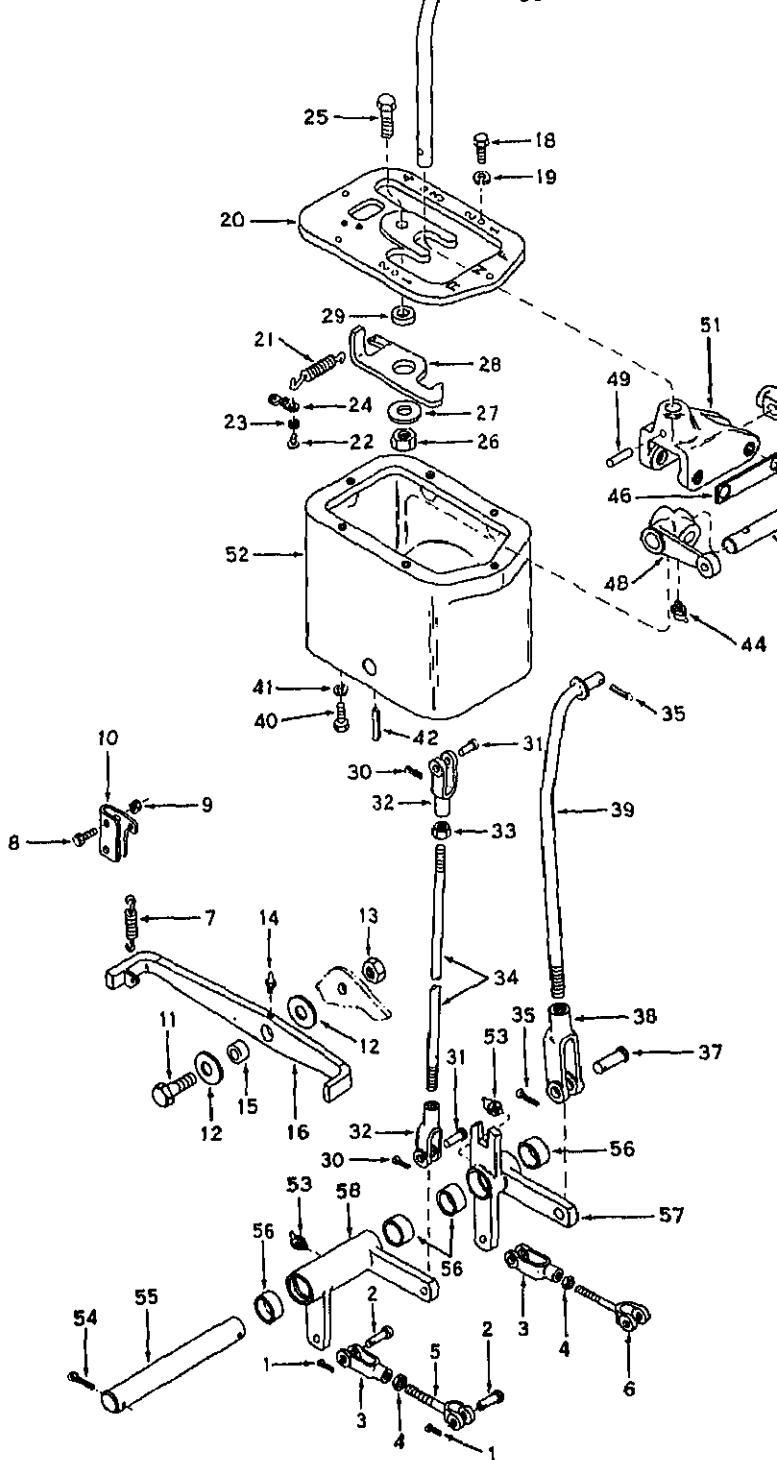


Figure 4-18. Transmission control levers, removal, disassembly, reassembly and installation (sheet 1 of 2).

4 Jammer
 5 Rod
 6 Rod
 7 Spring
 8 Screw
 9 Nut
 10 Spring anchor
 11 Screw
 12 Washer
 13 Nut
 14 Fitting
 15 Bushing
 16 Lever
 17 Knob
 18 Screw
 19 Washer
 20 Cover
 21 Spring
 22 Screw
 23 Washer
 24 Spring tab
 25 Screw
 26 Nut
 27 Washer
 28 Plate
 29 Bushing
 30 Pin
 31 Pin
 32 Clevis
 33 Nut
 34 Rod
 35 Pin
 36 Washer
 37 Pin
 38 Clevis
 39 Rod
 40 Screw
 41 Washer
 42 Pin
 43 Pin
 44 Fitting
 45 Screw
 46 Tab
 47 Block
 48 Arm
 49 Pin
 50 Lever
 51 Lever
 52 Housing
 53 Fitting
 54 Pin
 55 Shaft
 56 Bushing
 57 Bellcrank
 58 Bellcrank



ME 2420-20

Figure 4-18. Transmission control levers, removal, disassembly, reassembly and installation (sheet 2 of 2).

4-24. Parking Brake Hand Lever and Cable

a. Removal.

- (1) Remove rock guard (para 4-58).
- (2) Remove parking brake hand lever assembly and cable as illustrated in figure 4-19.

b. Cleaning and Inspection.

- (1) Clean parts and dry thoroughly.
- (2) Inspect for cracks, breaks and other damage. Replace damaged or defective parts as necessary. Lubricate cable with light oil.

c. Installation and Adjustment.

- (1) Install parking brake hand lever and cable as illustrated in figure 4-19.

(a) Rotate adjustment knob clockwise to correct cable tension pressure on brake shoe. If adjustment cannot be corrected, rotate counter-clockwise and remove cotter and clevis pins that secure lower end of parking brake cable to oper-

ating end of cable. Reconnect cable with threaded end of cable. Reconnect cable with and cotter pins and readjust as directed above.

(b) To adjust brake shoe remove cotter pins from parking brake operating clevis pins from parking brake operating. Rotate eccentric adjuster in direction of brake drum rotation until adjustment end of shoe contacting the eccentric is within 0.010 inch of drum surface, when measured by fit on feeler gages inserted from open end of

(c) Expand brake shoes by turning adjustment star wheel with a screwdriver inserted through drum.

(d) Repeat adjustment until adjustment end of lining on other shoe is within 0.010 inch of drum surface.

(e) Install brake cable.

- (2) Install rock guard (para 4-58).

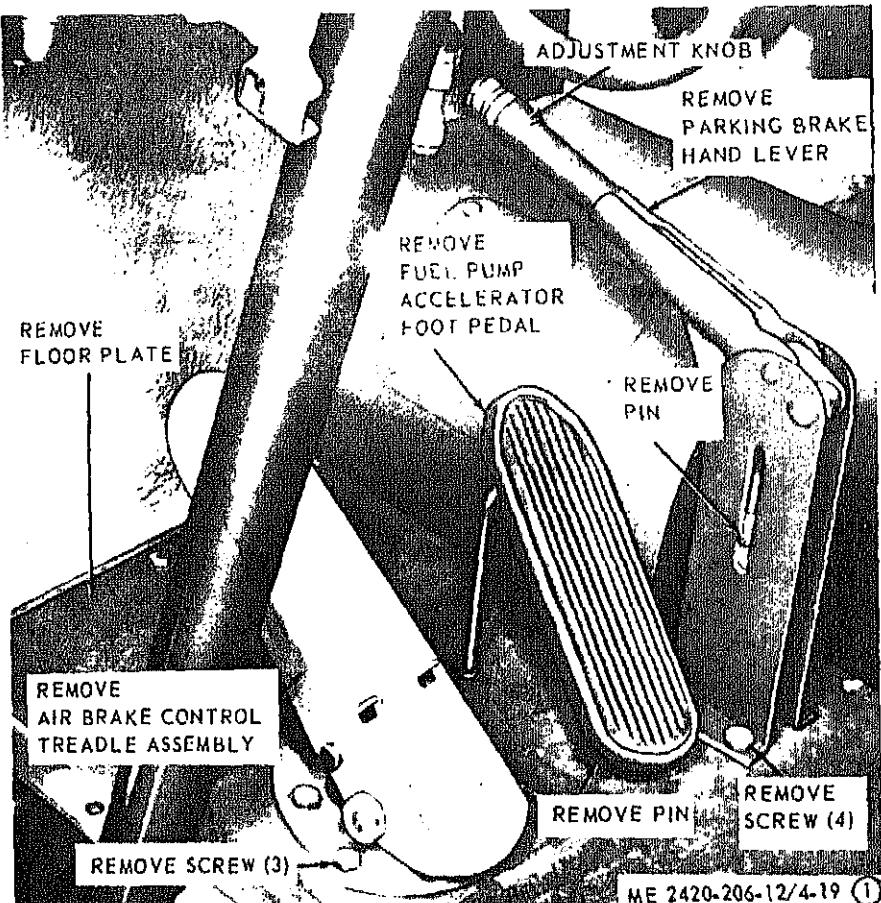


Figure 4-19. Parking brake hand lever and cable, removal and installation (sheet 1 of 2).

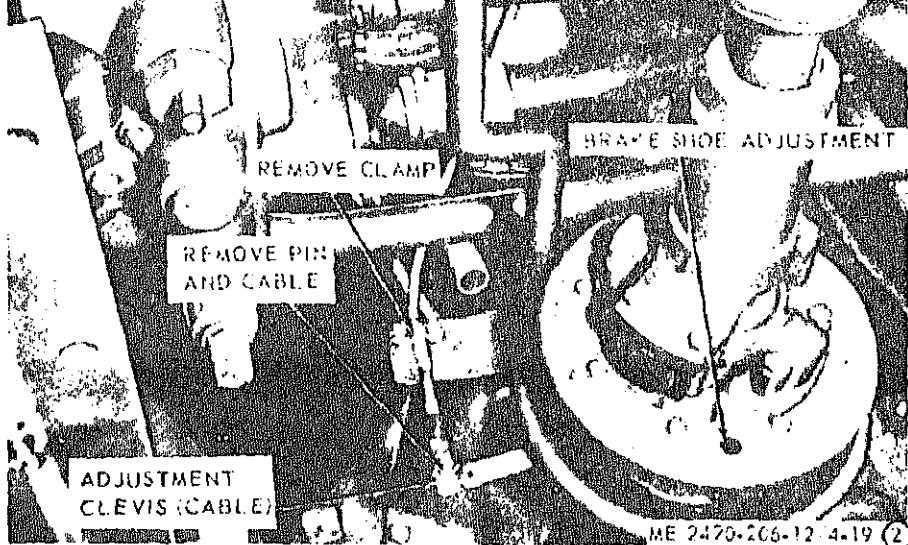


Figure 19. Parking brake hand lever and cable, removal and installation (sheet 2 of 2).

4-25. Accelerator Pedal and Linkage

a. Removal and Disassembly. Remove and disassemble accelerator pedal and linkage as illustrated in figure 4-20.

b. Cleaning and Inspection.

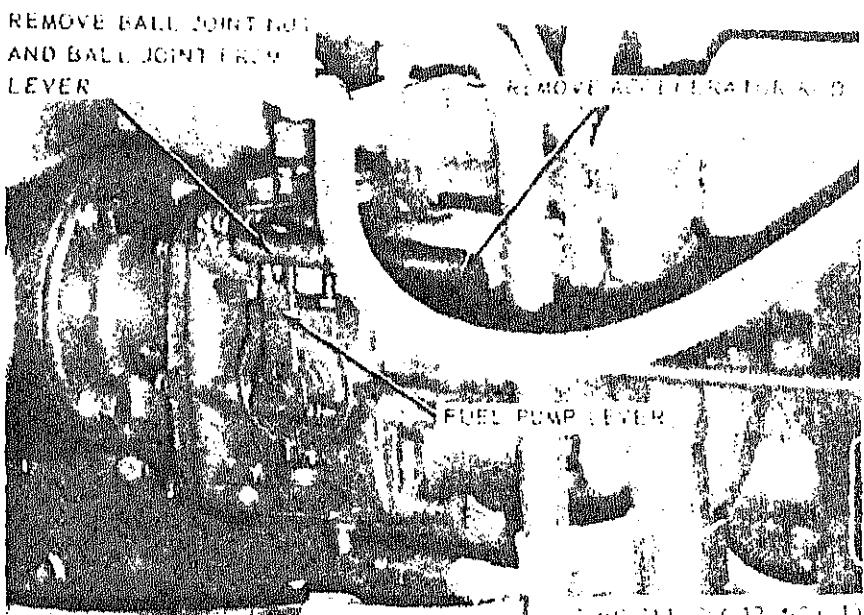
(1) Clean parts and dry thoroughly.
 (2) Inspect for cracks, breaks and other damage. Replace defective parts as necessary.

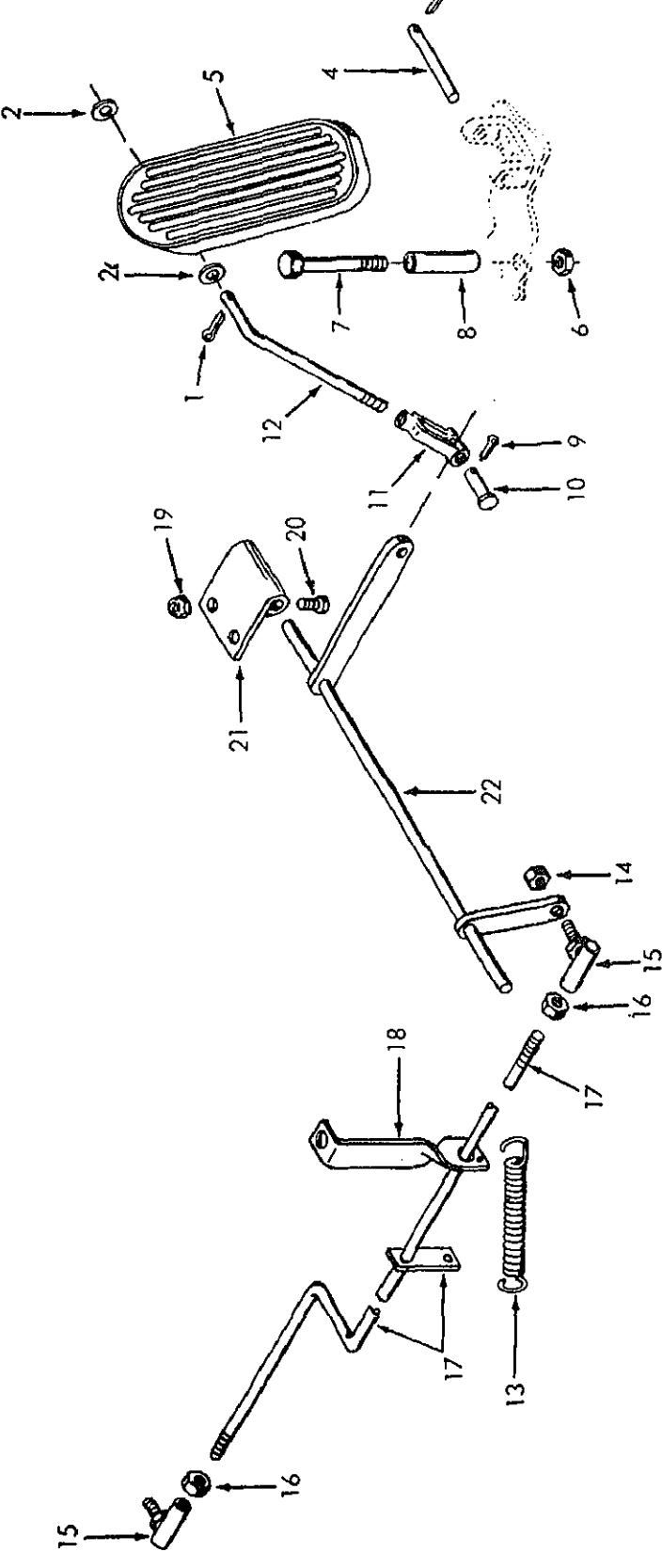
c. Reassembly and Installation. Reassemble as illustrated in figure 4-20.

d. Adjustment.

(1) Adjust ball joints to correct operating linkage. Position accelerator pedal by adjusting clevis (11) on rod (12).

(2) Adjust pedal stop screw to correct position on pedal.





1	Pin	12	Rod
2	Washer	13	Spring
3	Pin	14	Nut
4	Pin	15	Ball joint
5	Pedal	16	Nut
6	Nut	17	Rod
7	Screw	18	Guide
8	Stop	19	Nut
9	Pin	20	Screw
10	Pin	21	Plate
11	Clevis	22	Bellcrank

Figure 4-20. Accelerator pedal and linkage, removal, disassembly, reassembly, and installation (sheet 2 of 2).

26. General

Engine coolant, electrical, oil and fuel components listed herein are attached on or near the engine block.

27. Starter and Solenoid

a. Testing. With battery fully charged and main switch in the ON position, press starter switch. The starting motor should smoothly turn over engine at a sufficient rate of speed to cause starting without unusual noise or vibration. Check all electrical leads before removing starter and solenoid. Starter fails to turn over engine.

Note. Remove cable from battery terminal before removing starter.

b. Removal. Remove starter as illustrated in figure 4-21. Match mark the end bell frame (3), starter motor housing (55), lever housing (28), and drive housing (21) to assure proper reassembly.

c. Cleaning, Inspection and Test.

(1) Clean starter and solenoid with a cloth.

(2) Inspection.

(a) Inspect brushes (17) for wear and brush springs (18) for distortion or weakness. Replace brushes if worn to less than half their original length. Spring tension should be 80 ounces minimum with brushes installed.

(b) Inspect motor drive clutch (23) for cracked, chipped, or broken gear teeth, or other defects.

(c) Inspect plunger assembly (41) for damage.

(d) Inspect all items removed for cracks, breaks and other damage. Repair or replace items 4, 8, 10, 13, 14, 17, 18, 22, 24, 25, 29, 30, 42, 47, and 49 which are in the repair kit. Turn armature shaft by hand to assure it rotates freely. Replace defective starter, solenoid, and cables.

d. Installation. Install starter and solenoid as illustrated in figure 4-21. Replace gasket.

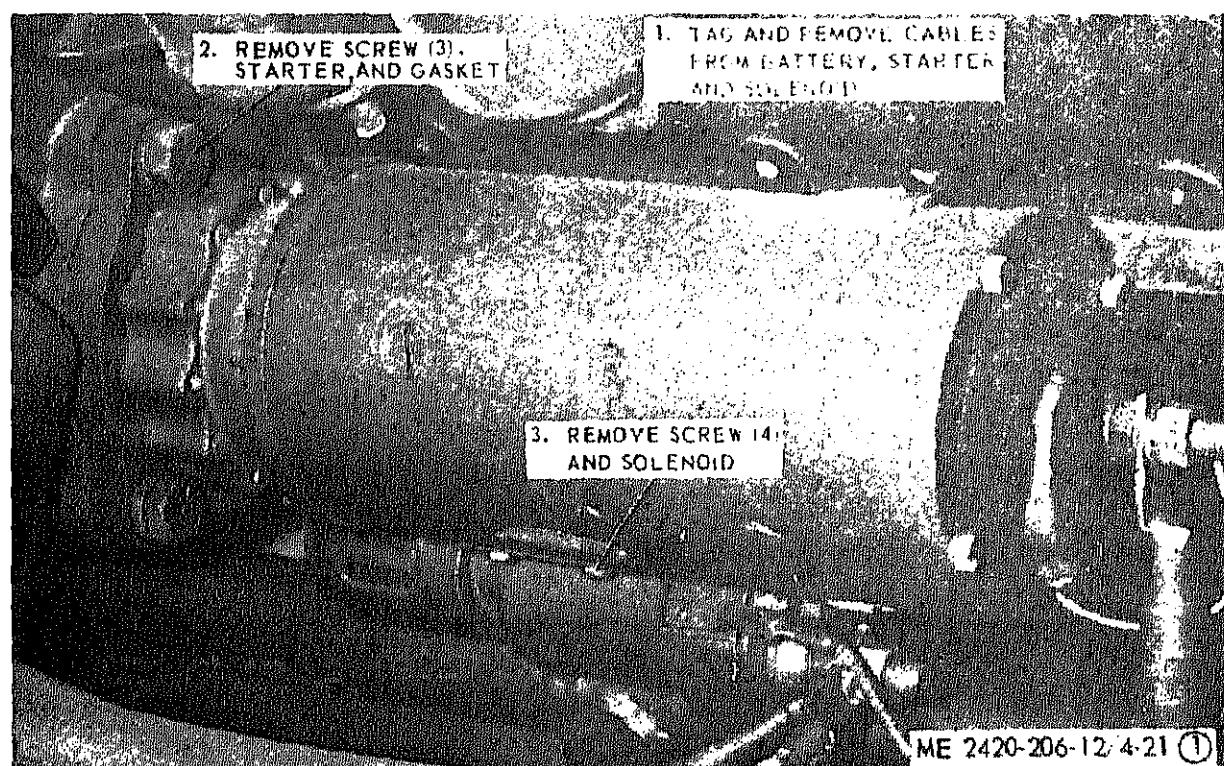
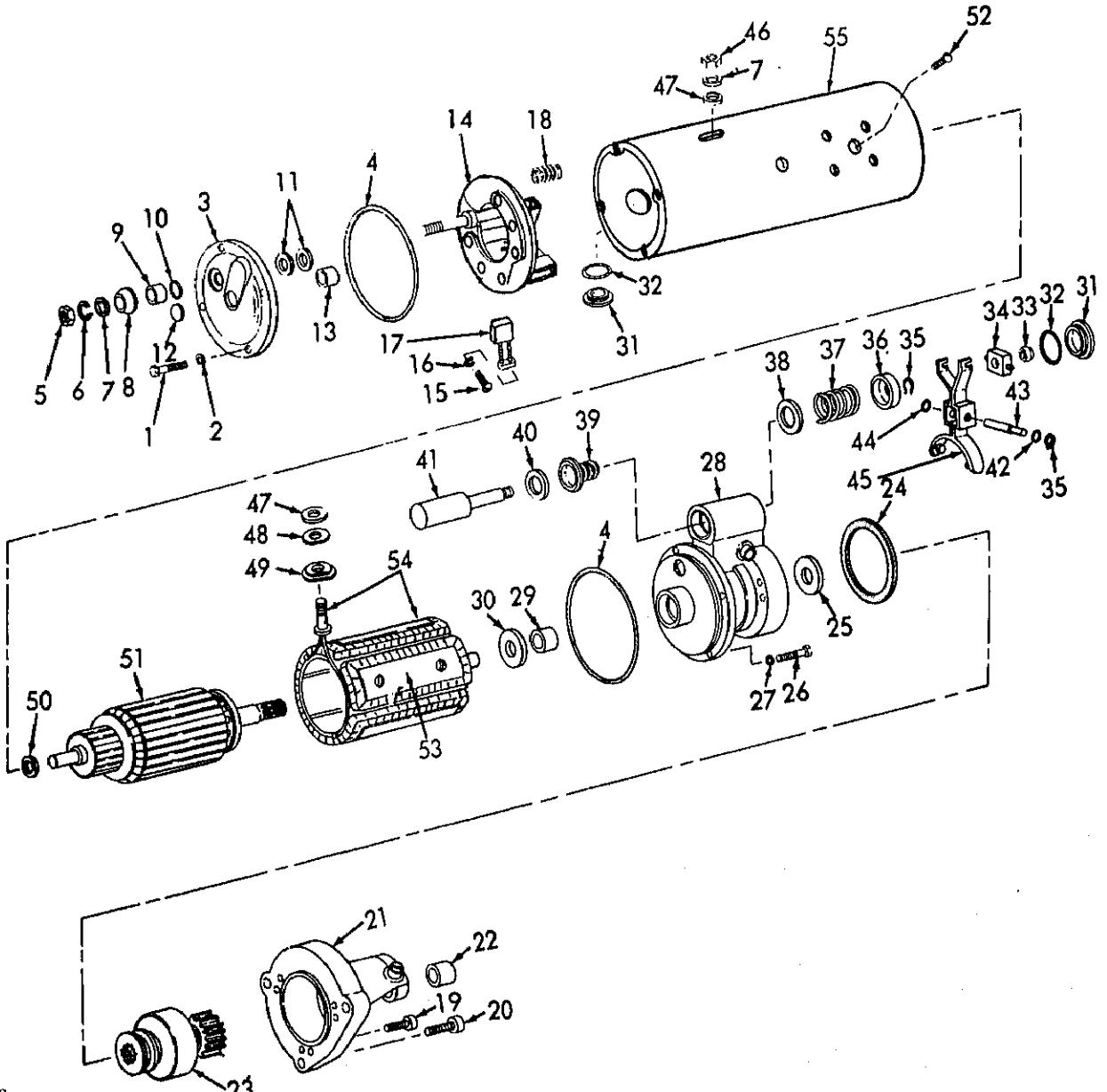


Figure 4-21. Starter and solenoid, removal, disassembly, reassembly, and installation (sheet 1 of 2).



1 Screw
 2 Washer
 3 End bell frame
 4 Ring
 5 Nut
 6 Washer
 7 Washer
 8 Insulator
 9 Bushing
 10 Packing
 11 Washer
 12 Plug
 13 Bearing
 14 Brush holder assembly
 15 Screw
 16 Washer
 17 Brush
 18 Bushing
 19 Brush spring
 20 Bolt
 21 Drive housing
 22 Bushing
 23 Motor drive clutch
 24 Gasket
 25 Washer
 26 Bolt
 27 Washer
 28 Lever Housing
 29 Bearing
 30 Washer
 31 Plug
 32 Gasket
 33 Nut
 34 Plunger guide
 35 Ring
 36 Retainer
 37 Spring
 38 Retainer
 39 Plug
 40 Bushing
 41 Plunger assembly
 42 Packing
 43 Shaft
 44 Packing
 45 Shift lever assembly
 46 Nut
 47 Washer
 48 Gasket
 49 Insulator
 50 Washer
 51 Armature
 52 Screw
 53 Shoe pole

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(2) Inspect brush holders, springs and brushes for cracks, breaks, wear, distortion and other damage. Brushes should move freely in their holders. Replace damaged or defective parts as necessary.

(a) Remove screw and lockwasher that secure brush leads to holder.

(b) Lift brush arm that retains brush in holder; remove brush.

(c) To replace, reverse above procedure.

(3) If commutator segment wear and excessive heat burns cannot be corrected with emery cloth application to segments, replace generator assembly.

b. Removal of Generator Drive Belt.

(1) Remove generator drive belt as illustrated in figure 4-22.

move lower capscrew (4) and its lockwasher, capscrew (13), flat washer, lockwasher, and nut.

(c) Loosen capscrews (6) and (10) that secure generator adjusting strap and loosen nut (11) that secures generator (12) to the frame; push generator towards frame to loosen generator drive belt.

(d) Slide fan blade, fan hub, and fan bracket (3) forward until space between water pump fan bracket is adequate to remove generator fan belts.

c. Cleaning and Inspection of Generator Drive Belt.

(1) Clean generator drive belt with a cloth.

(2) Inspect belt for cracks, missing belt teeth, or other damage. Replace as necessary.

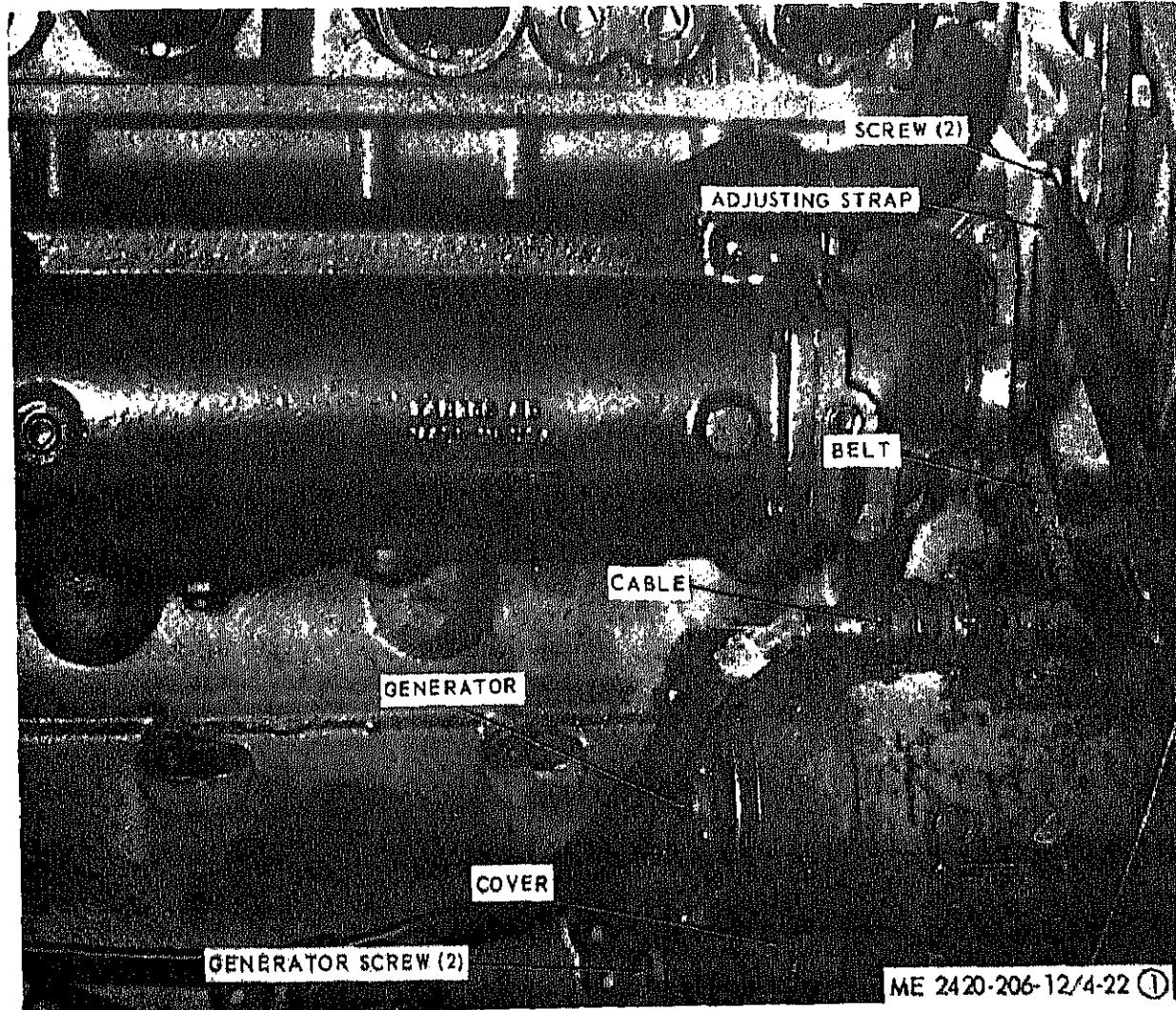


Figure 4-22. Generator repair, removal and installation (sheet 1 of 2).

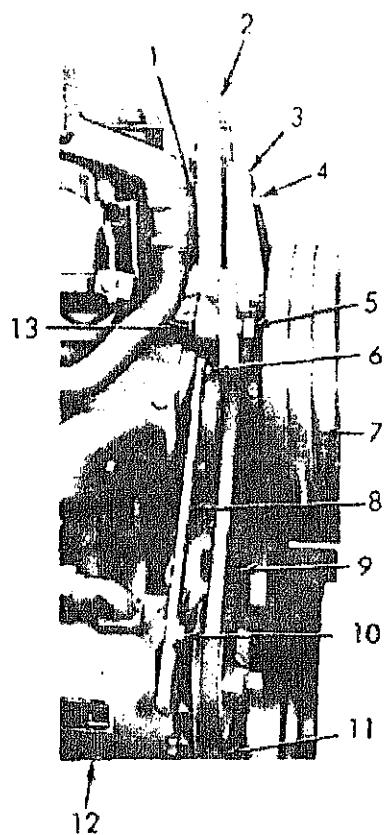
drive belt in reverse order of removal.

e. Belt Tension Adjustment.

(1) Loosen adjusting strap and generator ews and move generator away from engine to apply tension on belt.

(2) Secure adjusting strap and generator ews when tension deflection of 1 inch is indicated by depressing belt with fingers midway between pulleys.

(3) Correct generator belt tension after correcting water pump belt tension (para 4-38).



ME 2420-206-12/4-22 (2)

Fan bracket adjusting block
Adjusting screw
Fan bracket
Cap screw
Nut
Cap screw
Fan belt

8 Adjusting strap
9 Generator drive belt
10 Cap screw
11 Nut
12 Generator
13 Cap screw

Figure 4-22. Generator, repair, removal and installation, (sheet 2 of 2).

f. Removal of Generator.

(1) Remove generator drive belt as directed

lockwasher that secure generator to adjust strap (8) and two cap screws, lockwashers, and nuts (11) that secure generator to bracket; remove generator.

g. Cleaning and Inspection of Generator.

(1) Clean exterior of generator and dry thoroughly.

(2) Inspect generator as directed in *a* above. Rotate generator armature shaft manually to assure it rotates freely. Inspect for overheating and burned insulation.

(3) Inspect all parts for cracks, wear or other damage; replace as necessary.

h. Installation of generator.

(1) Install generator in reverse order of removal.

(2) Install generator drive belt as directed *d* above.

(3) Polarize generator as directed in *t* below.

i. Generator Polarizing.

(1) Polarize generator before starting engine whenever generator cable has been removed from generator.

(2) Disconnect generator-to-voltage regulator cable at voltage regulator, and battery connection cable from voltage regulator; momentarily connect a wire from the B terminal of generator cable to battery connection cable.

(3) Install cable.

4-29. Generator Regulator

a. Description. The generator regulator is a her-tight, radio-suppressed, corrosion and fungus-resistant unit designed for use with a generator having an internally grounded field circuit, and a system with a negative ground. The regulator is composed of three units, a cutout relay, voltage regulator, and current regulator. The cutout relay closes the circuit to the batteries. The voltage regulator regulates the generator output to the batteries within preset limits. The current regulator regulates the amount of current being delivered to the batteries.

b. Testing. When ammeter on instrument panel indicates:

(1) High charging rate with fully charged battery. (If temperatures are high, the battery normally accept a high rate of charge. If operating condition is not due to high temperatures, perform the following checks:)

(a) Check charging rate of battery.

speed. If output remains high, the generator or wiring is at fault. If no output is obtained, remove generator regulator for adjustment or refer to direct support maintenance for repair.

(2) Low or no charging rate with low battery.

(a) Check for loose connections, frayed or damaged wires.

(b) Check battery (para 4-59).

(c) Insert testing harness, fig 4-23, in generator regulator circuit. Operate generator regulator at medium speed and (battery connected) momentarily connect T-3 to T-1 (armature) and increase generator speed. If output does not increase, check generator. If output increases, remove generator regulator for adjustment or refer to direct support maintenance for repair.

c. *Removal.* Remove defective, damaged, generator regulator as illustrated in figure 4-23. Tape ends of cables to avoid short circuiting.

d. *Installation.* Install new generator regulator in reverse order of removal.

Note. Polarize generator before cranking engine (para 4-28i).

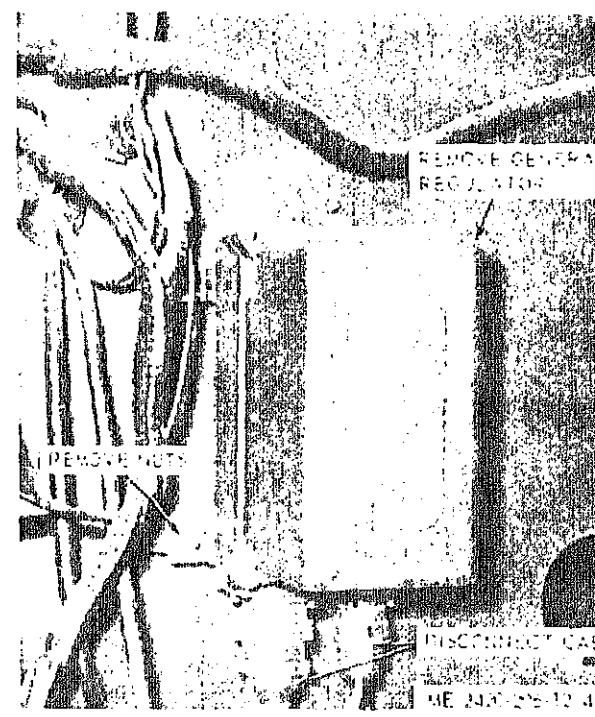


Figure 4-23. Generator regulator, testing, removal and installation (sheet 1 of 2).

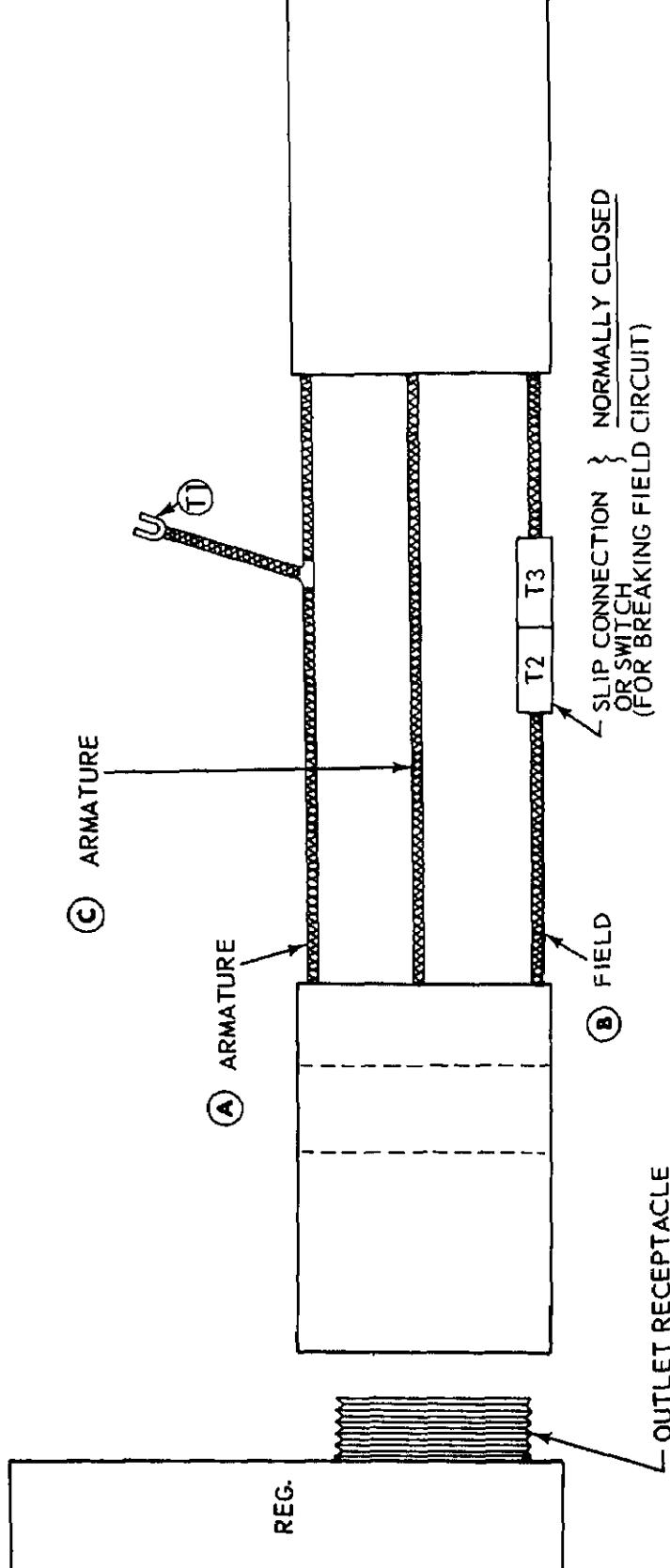


Figure 4-23. Generator regulator, testing, removal and installation (sheet 2 of 2).

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-30. Coolant Thermostat

Note. Replace coolant thermostat when temperatures of 40° F to 195° F cannot be maintained during normal operation of tractor.

a. Removal. Remove thermostat as illustrated in figure 4-24.

b. Cleaning and Inspection.

(1) Clean thermostat housing and parts with a

cooling system flushing solution.

(2) Inspect for cracks, breaks and other damage. Replace defective parts as necessary.

c. Test. Thermostat should open fully when immersed in water heated to 200° F. Replace a defective thermostat.

d. Installation. Install thermostat in reverse order of removal; replace gasket, fill radiator.

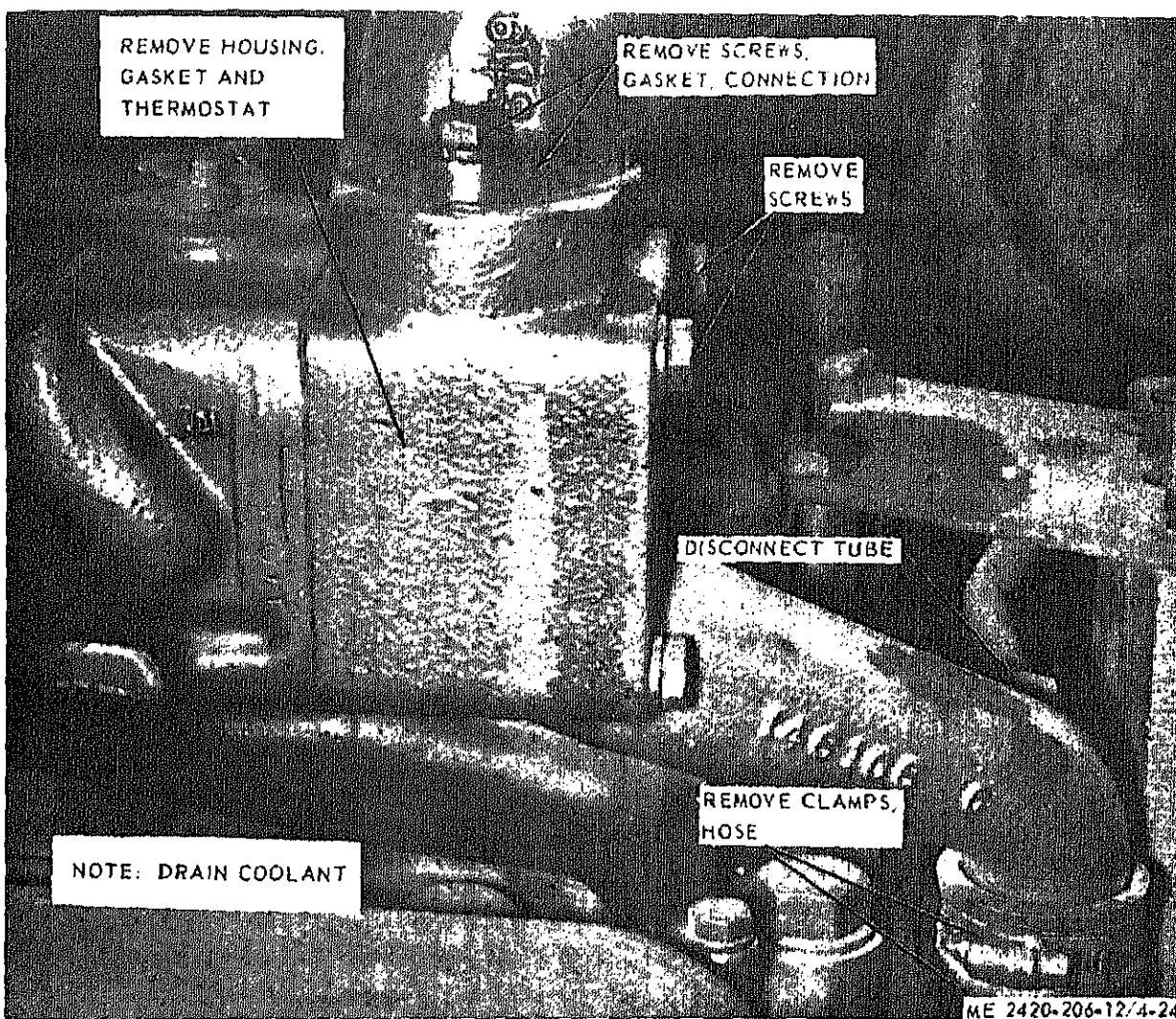


Figure 4-24. Coolant thermostat, removal and installation.

31. Water Filter (Corrosion Resister)

c. Installation. Install water filter in reverse order

(2) Inspect for cracks, breaks and damage.
Replace defective head and lines.

c. Installation.

(1) Install filter heads as illustrated in figure 4-25.

(2) Install elements (para 3-5).

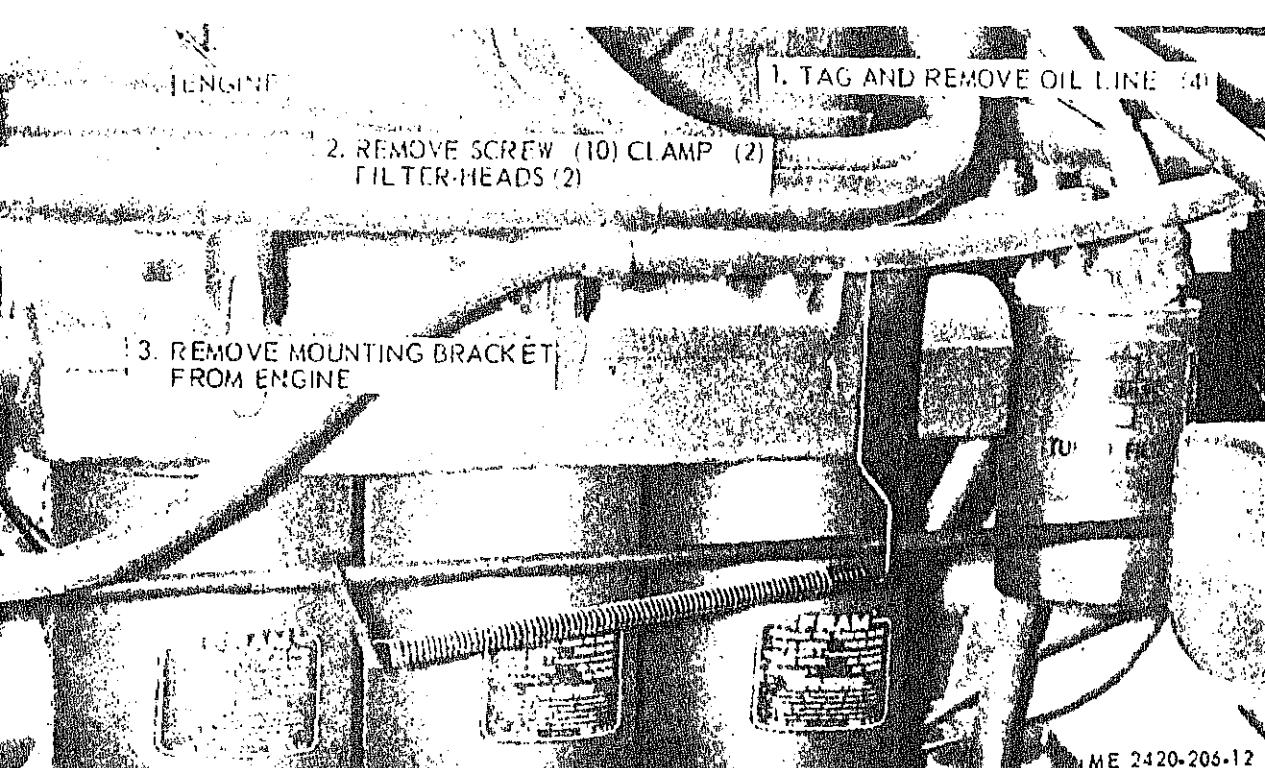


Figure 4-25. Engine and turbocharger filter head, removal and installation.

33. Fuel Filter Head

a. Removal.

- (1) Remove elements (para 3-6).
- (2) Remove filter head as illustrated in figure 26.

b. Cleaning and Inspection.

- (1) Clean head and dry thoroughly.

(2) Wipe lines with a cloth.

(3) Inspect for cracks, breaks and other damage.

Replace defective head and lines as necessary.

c. Installation.

- (1) Install filter heads as illustrated in figure 4-26.
- (2) Install elements (para 3-5).

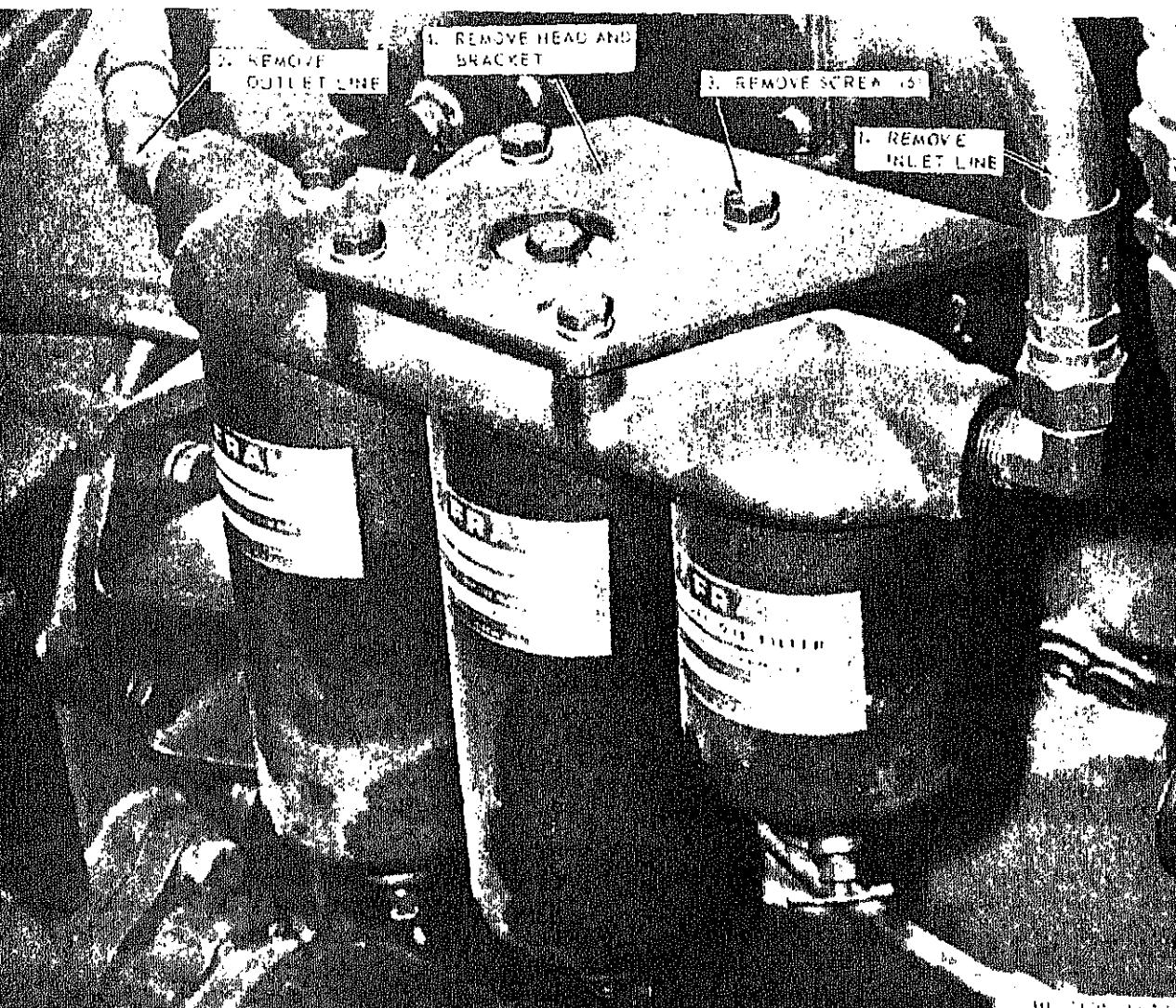


Figure 4-26. Fuel filter head, removal and installation.

-34. Fuel Shut Down Valve

a. Removal and Disassembly.

- (1) Tag and disconnect electrical leads.
- (2) Remove governor speed and tachometer cables.
- (3) Remove and disassemble fuel shut down valve as illustrated in figure 4-27.

b. Cleaning and Inspection.

- (1) Clean parts and dry thoroughly. Clean lines and cables. Replace and lubricate preformed packings.

age. Apply 24 volts DC across terminals of assembly and check magnetic attraction at inner face of coil assembly with a screwdriver blade. With power applied, it should exert a strong magnetic force. Replace a defective fuel shut down valve if necessary.

c. Reassembly and Installation.

- (1) Reassemble and install fuel shut down valve as illustrated in figure 4-27.
- (2) Install governor speed and tachometer cables.

REMOVE FUEL LINE (2)

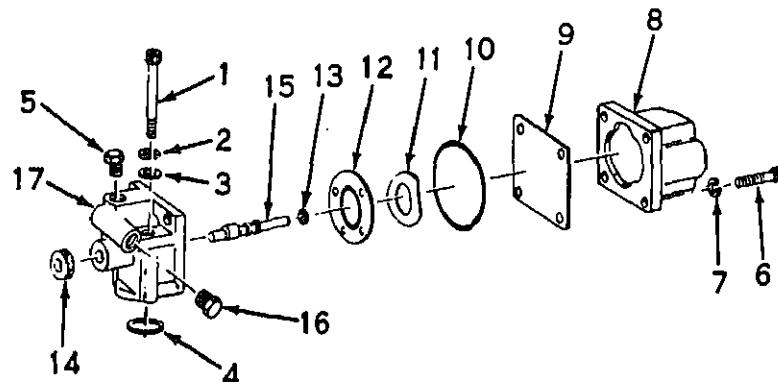
REMOVE SCREW (2)

REMOVE FUEL
SHUT DOWN VALVE



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Figure 4-27. Fuel shut down valve, removal, disassembly, reassembly, and installation (sheet 1 of 2).



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1 Capscrew

2 Lockwasher

3 Flat washer

4 Preformed packing

5 Connection

6 Capscrew

7 Knob

10 Preformed packing

11 Spring

12 Valve

13 Preformed packing

14 Knob

15 Shaft

16 Pipe plug

4-35. Aneroid

a. Description. The aneroid provides a fuel bypass system that responds to intake manifold pressure of turbocharged engine to provide a close control of exhaust smoke. It limits the fuel pressure to the injectors when acceleration speeds are below normal operating speed range and manifold air pressure is not sufficient for complete combustion.

b. Removal and Disassembly.

- (1) Remove elements (para 3-10).
- (2) Remove and disassemble aneroid as illustrated in figure 4-28.

c. Cleaning and Inspection.

- (1) Clean parts and dry thoroughly.
- (2) Inspect for cracks, breaks, wear and other damage. Replace defective parts as necessary.

d. Reassembly and Installation.

Reassemble and install aneroid as illustrated in figure 4-28.

- (2) Install elements (para 3-10).

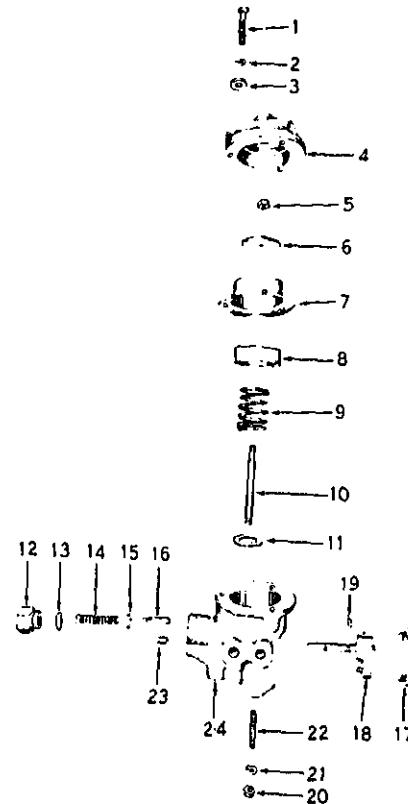
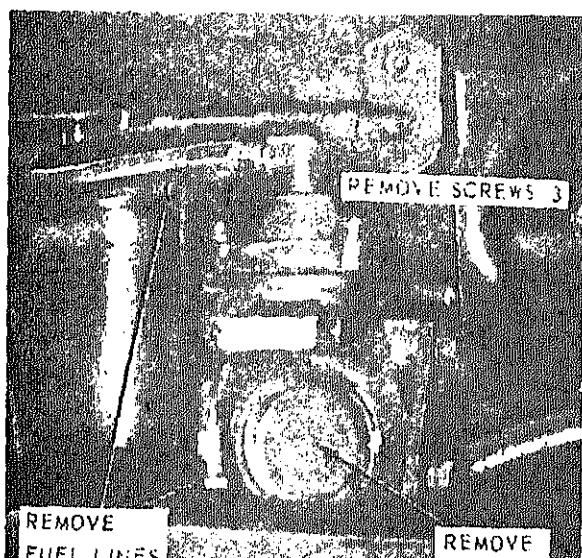
e. Adjustment.

(1) Fuel pump must be calibrated before adjusting aneroid; refer to DS Maintenance. Fill aneroid with lubricating oil.

- (2) Check fuel manifold pressure as follows:

(a) Disconnect pressure line and drain line from aneroid to fuel pump. Disconnect air line from aneroid to air intake manifold. Plug lines and connections to keep air out of fuel system.

(b) Check fuel manifold pressure with pressure gage. Accelerate from idle to full throttle and check maximum pressure indicated on gage.



ME 2420-206-12/4-28 (2)

1 Screw	13 Packing
2 Washer	14 Spring
3 Washer	15 Washer
4 Cover	16 Plunger
5 Nut	17 Cover
6 Washer	18 Lever and valve assembly
7 Bellows	19 Packing
8 Piston	20 Nut
9 Spring	21 Seal
10 Shaft	22 Screw
11 Shim	23 Pin
12 Retainer	24 Housing

Figure 4-28. Aneroid, removal, disassembly, reassembly and installation (sheet 2 of 2).

Pressure must be 2000 psi at 2300 rpm. Refer to DS Maintenance.

(3) Check air intake manifold pressure with mercury manometer. Pressure should be 34 to 36 psi. If pressure is low, check turbocharger for proper operation.

(4) Connect fuel lines from aneroid to fu-

(7) Make final adjustments as follows:

(a) Connect line from aneroid to air intake manifold.

(b) Start engine and check idle speed. In most cases, idle will be low and must be adjusted upward with fuel pump governor idle screw.

(c) Check engine operation. If smoke is not excessive during first 15 seconds of full throttle operation, but becomes excessive thereafter, check fuel system and turbocharger before readjusting aneroid.

(d) If hard starting is encountered, aneroid valve may be sticking in the open position. Replace if necessary.

4-36. Engine Speed Governor (Indicator)

a. Removal and Disassembly.

(1) Refer to paragraph 4-20 and figure

(2) Disassemble engine speed governor as illustrated in figure 4-29.

b. Cleaning and Inspection.

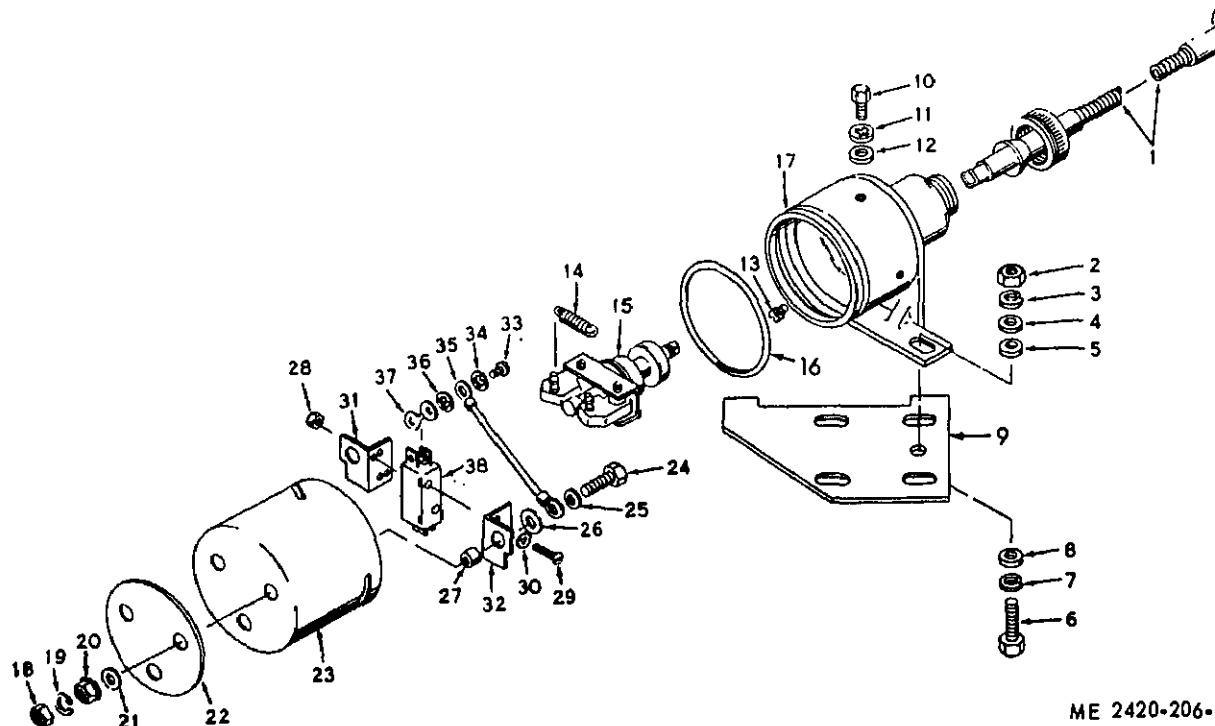
(1) Clean parts and dry thoroughly. Preformed packing.

(2) Inspect for cracks, breaks, wear and damage. Replace defective parts as necessary.

c. Reassembly and Installation.

(1) Reassemble and install engine speed governor as illustrated in figure 4-29.

(2) Refer to paragraph 4-20 and figure



- 1 Drive shaft
- 2 Nut
- 3 Lockwasher
- 4 Flatwasher
- 5 Rubber washer
- 6 Capscrew
- 7 Lockwasher
- 8 Flatwasher
- 9 Overspeed top bracket
- 10 Capscrew
- 11 Lockwasher
- 12 Flatwasher
- 13 Guide stud
- 14 Spring
- 15 Potentiometer
- 16 Bottom bracket
- 17 Body
- 18 Nut
- 19 Lockwasher
- 20 Flatwasher
- 21 Insulating washer
- 22 Cap
- 23 Capscrew
- 24 Flatwasher
- 25 Insulating washer
- 26 Insulating bushing
- 27 Insulating bushing
- 28 Nut
- 29 Screw
- 30 Lockwasher
- 31 Right switch mounting bracket
- 32 Left switch mounting bracket
- 33 Screw

- 20 Nut
- 21 Flatwasher
- 22 Insulating washer
- 23 Cap
- 24 Capscrew
- 25 Flatwasher
- 26 Insulating washer
- 27 Insulating bushing
- 28 Nut
- 29 Screw
- 30 Lockwasher
- 31 Right switch mounting bracket
- 32 Left switch mounting bracket
- 33 Screw

illustrated in figure 4-30. Remove hood (fig 4-13) and upper radiator hose.

b. Cleaning and Inspection.

(1) Clean metal parts and dry thoroughly. Clean belts with a cloth.

(2) Inspect all parts for cracks, breaks and other damage. Replace defective parts as necessary. Replace belts in matched sets. Replace fan spacer

d. Belt Adjustment. Loosen fan pulley bracket capscrews (4, fig 4-22), nut (5), and turn adjustment screw (2), on fan bracket support, to correct belt tension. Adjust belt tension for a deflection of 1/2 inch when belt is depressed manually (finger) midway between pulleys. Tighten capscrews, and adjust generator drive belt (para 4-28e).

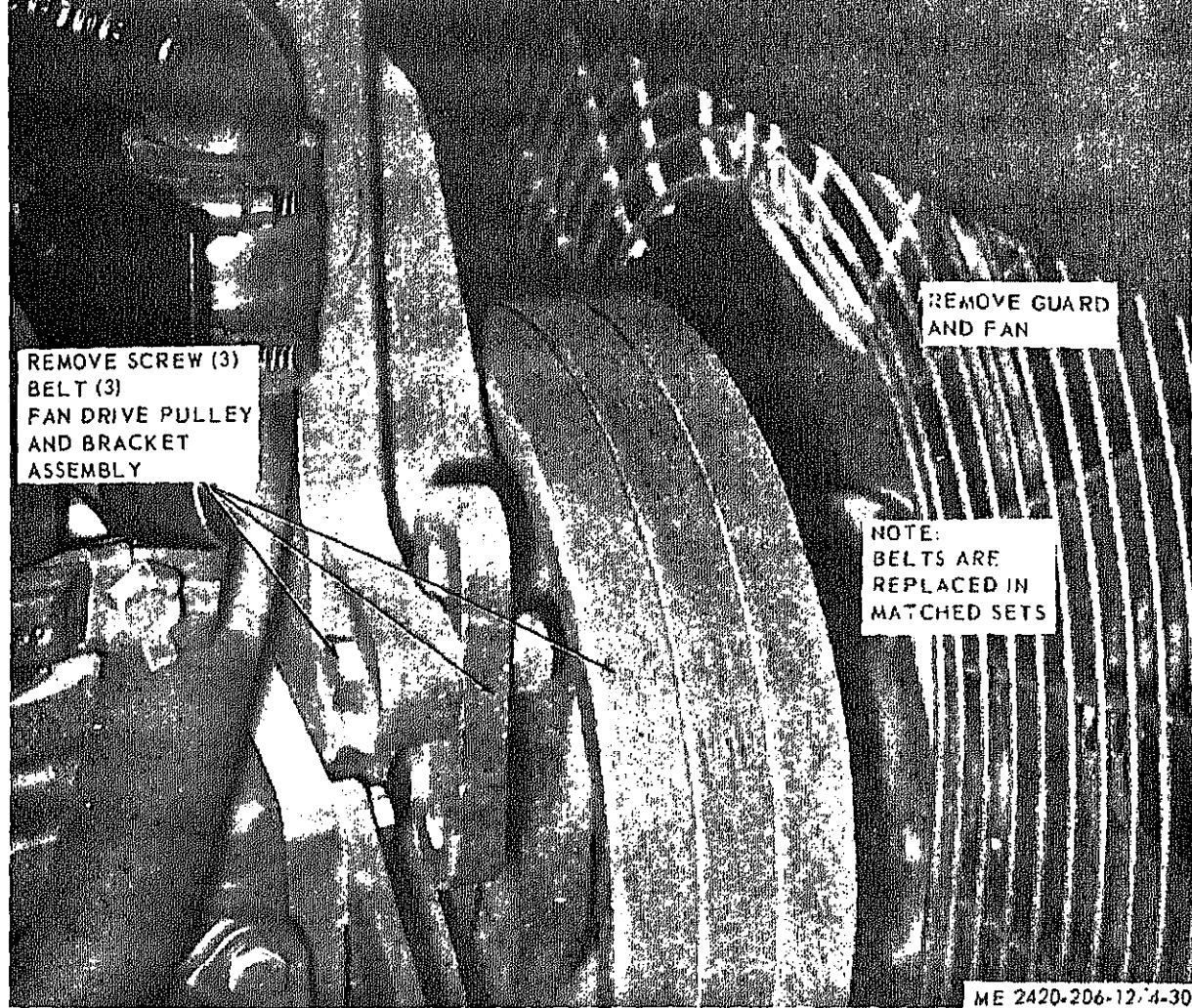


Figure 4-30. Fan drive pulley and belts, removal and installation.

38. Water Pump Belt

a. Removal and Installation.

(1) Remove generator belt (para 4-28).

(2) Water pump bracket screws must be loosened (do not permit coolant leaks). Turn water pump assembly and remove belt from water pump pulley.

b. Belt adjustment.

(1) Turn water pump assembly to apply tension on belt, with screwdriver inserted in hole provided in water pump. Correct tension is 1 in deflection when belt is depressed manually (finger) midway between pulleys.

(2) Tighten water pump bracket screws.

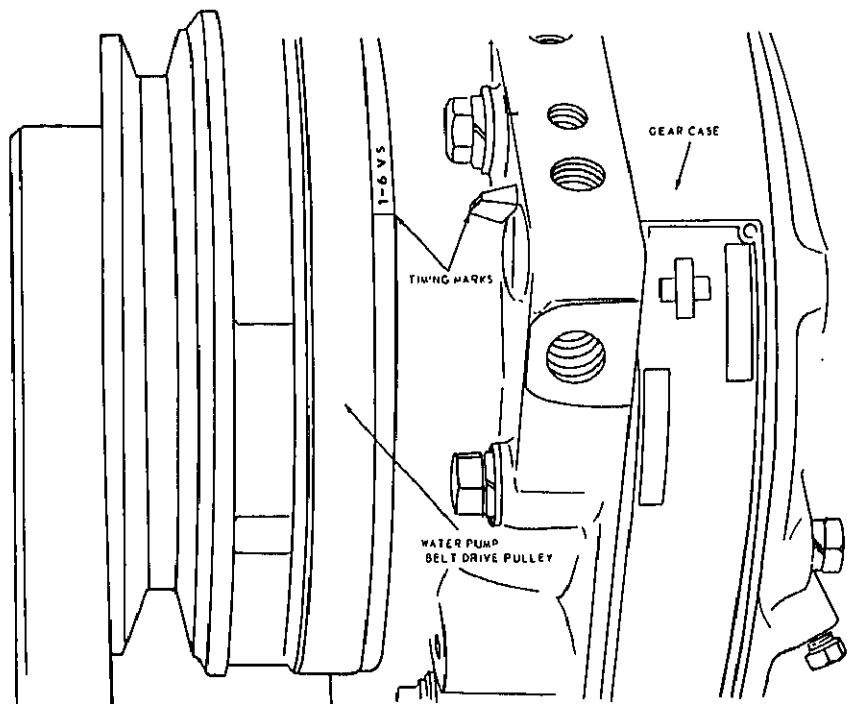
Section VI. ENGINE TIMING

4-39. General

Engine timing as contained herein, refers to adjustment of cylinder fuel injectors, crossheads and valves.

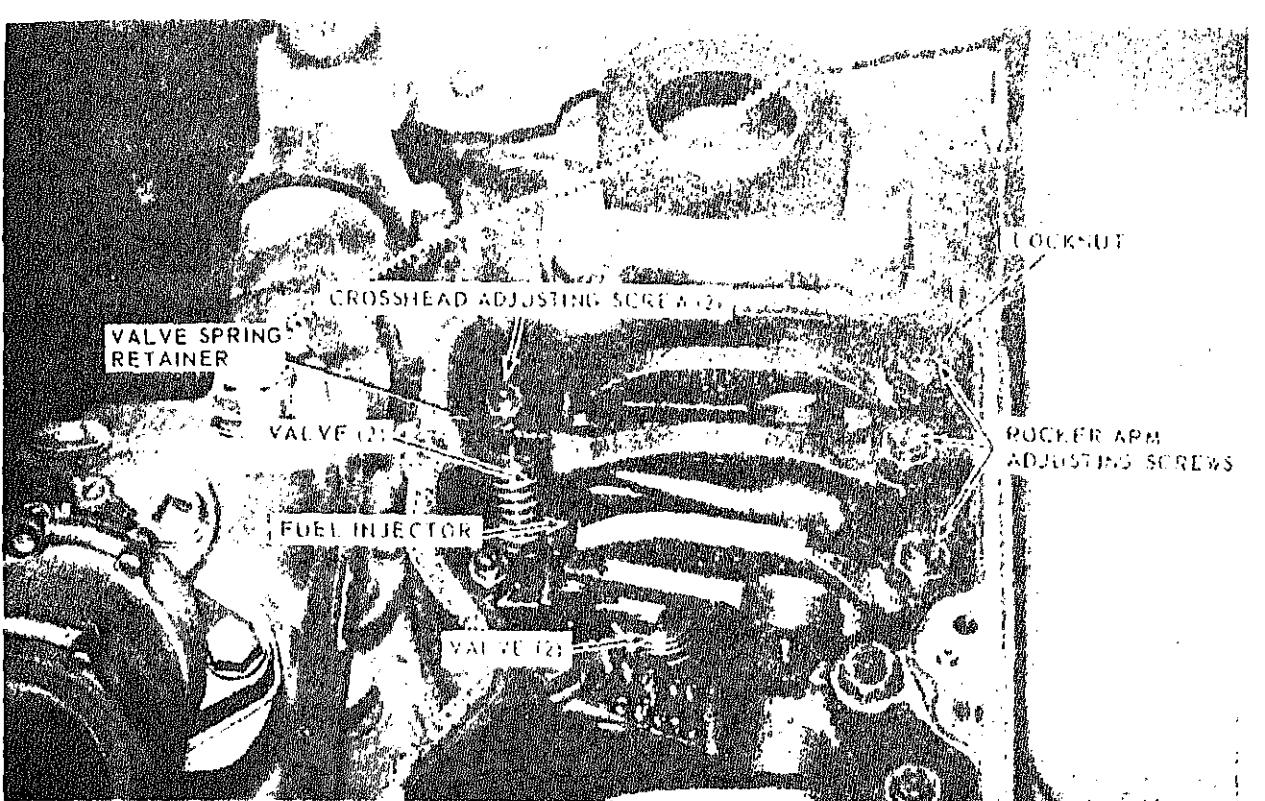
4-40. Timing Adjustments

a. Turn engine over manually to cylinder mark on pulley as illustrated in figure 4-31.



ME 2420-226-12/4-31 ①

Figure 4-31. Cylinder timing mark and timing adjustments.
(Sheet 1 of 2).



1. REMOVE HOOD.
2. REMOVE TURBOCHARGER.
3. REMOVE ROCKER ARM COVERS.
4. USE CYLINDER FIRING ORDER 1-5-3-6-2-4 AND TURN ENGINE OVER MANUALLY (BY DEPRESSING V-BELTS TO TIGHTEN) IN NORMAL DIRECTION (RIGHT-HAND ROTATION VIEWED FROM PAN END) TO TIME MARKS FOR NO. 1 CYLINDER.
5. ADJUST FUEL INJECTOR, CROSSHEAD AND VALVES AS FOLLOWS.
 - A. FUEL INJECTOR: MAKE SURE ROCKER ARM ADJUSTING SCREW IS SEATED IN PUSHROD SOCKET, TORQUE ADJUSTING SCREW 38 INCH POUNDS (COLD), 60 INCH POUNDS (HOT). TORQUE LOCKNUT 79 TO 80 FOOT POUNDS.
 - B. CROSSHEAD: LOOSEN ADJUSTING SCREW LOCKNUT AND BACK OFF SCREW WHILE TURN WITH A LIGHT FINGER PRESSURE APPLIED TO CROSSHEAD, HOLD IN CONTACT WITH VALVE STEM. USE ADJUSTING SCREW TO ALINE STEM TO BORE AND EQUALIZE PRESSURE ON VALVE STEMS. TORQUE LOCKNUT 25 TO 30 FOOT POUNDS. CHECK CLEARANCE BETWEEN CROSSHEAD AND VALVE SPRING RETAINER WITH A WIRE GAGE. MINIMUM CLEARANCE MUST BE 0.020 TO 0.025 INCH.
 - C. VALVES: LOSEN ROCKER ARM LOCKNUT AND BACK OFF ADJUSTING SCREW. INSERT FEELER GAGE BETWEEN ROCKER ARM AND CROSSHEAD. THE GAGE THICKNESS MUST BE AS FOLLOWS: INTAKE VALVES (CROSSHEAD) (COLD) 0.016 INCH (HOT) 0.014 INCH. EXHAUST VALVES (COLD) 0.029 INCH (HOT) 0.027 INCH. ADJUST SCREW UNTIL ROCKER ARM TOUCHES FEELER GAGE. TORQUE LOCKNUT 79 TO 80 FOOT POUNDS.
6. INSTALL ROCKER ARM COVERS, TURBOCHARGER AND HOOD.

ME 2420-206-12 4-31 (2)

Figure 4-31. Cylinder timing mark and timing adjustments
(Sheet 2 of 2).

b. Adjust injectors, crossheads, and valves in that order before cranking engine to cylinder time mark 5-6VS.

4-41. Fuel injectors.

tube and tip back injector lever until the injector can be removed.

(3) Remove two capscrews that secure the down plate of the injector to the cylinder head. Use one of the removed screws as a jacking screw to hold the injector in the cylinder head.

REMOVE ROCKER ARM COVERS

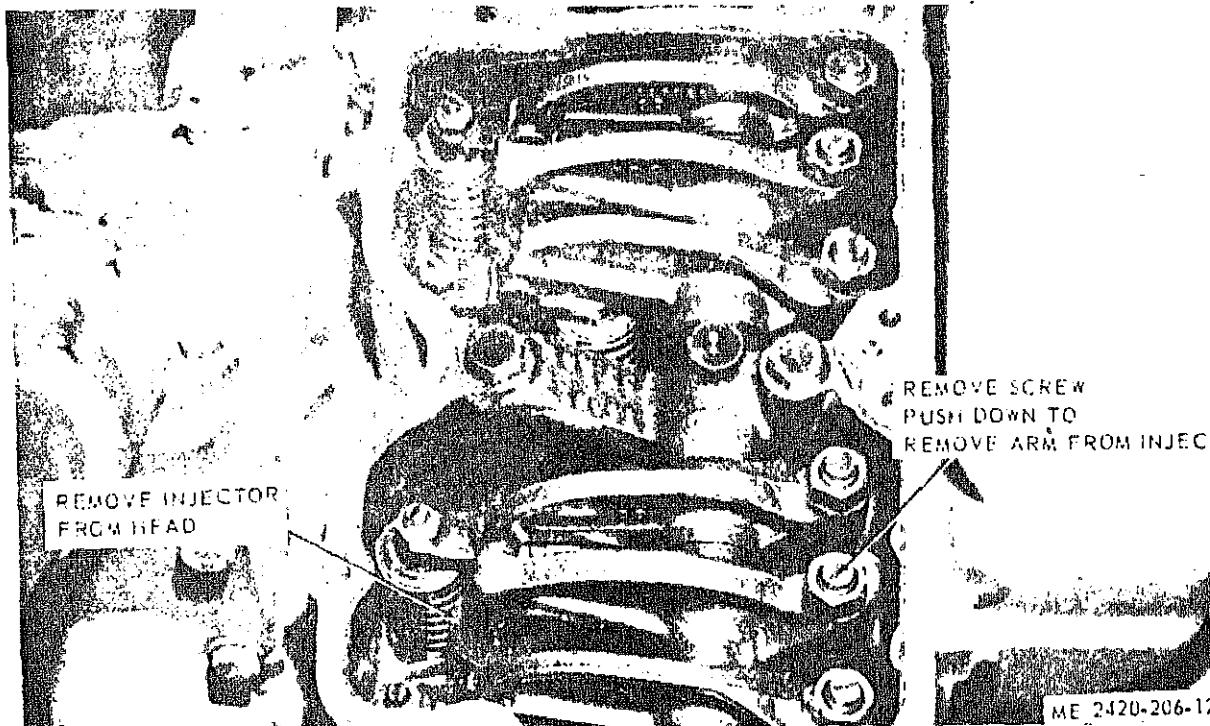


Figure 4-32. Fuel injector, removal and installation.

b. Installation and adjustment.

(1) Install fuel injector in reverse order of removal, fig. 4-32.

(2) Refer to paragraph 4-40 and adjust
(3) Install new rocker arm cover gasket

Section VII. STEERING AND SCRAPER HYDRAULIC SYSTEM

4-42. General

This section consists of steering and scraper hydraulic hose, lines, fittings, tank, filter, valves and cylinders.

4-43. Swivels and Hydraulic Lines

a. Description. The swivels provide 360° movement in one or more positions to prevent hydraulic lines connecting tractor and scraper from twisting or kinking.

b. Removal and Disassembly. Remove and disassemble hydraulic lines and swivels, and remove the swivel from the frame. See fig. 4-33.

thoroughly.

(2) Inspect for wear, cracks, breaks, and damage. Replace defective parts as necessary.

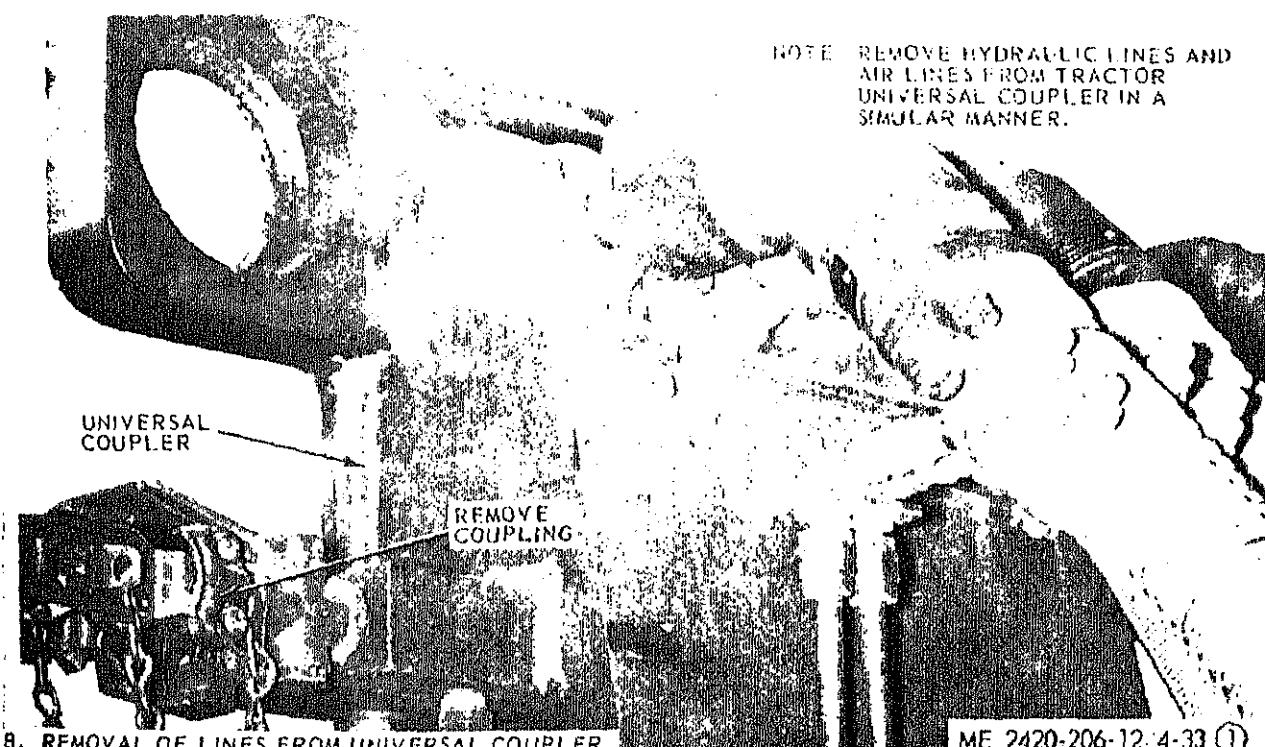
d. Reassembly and Installation.

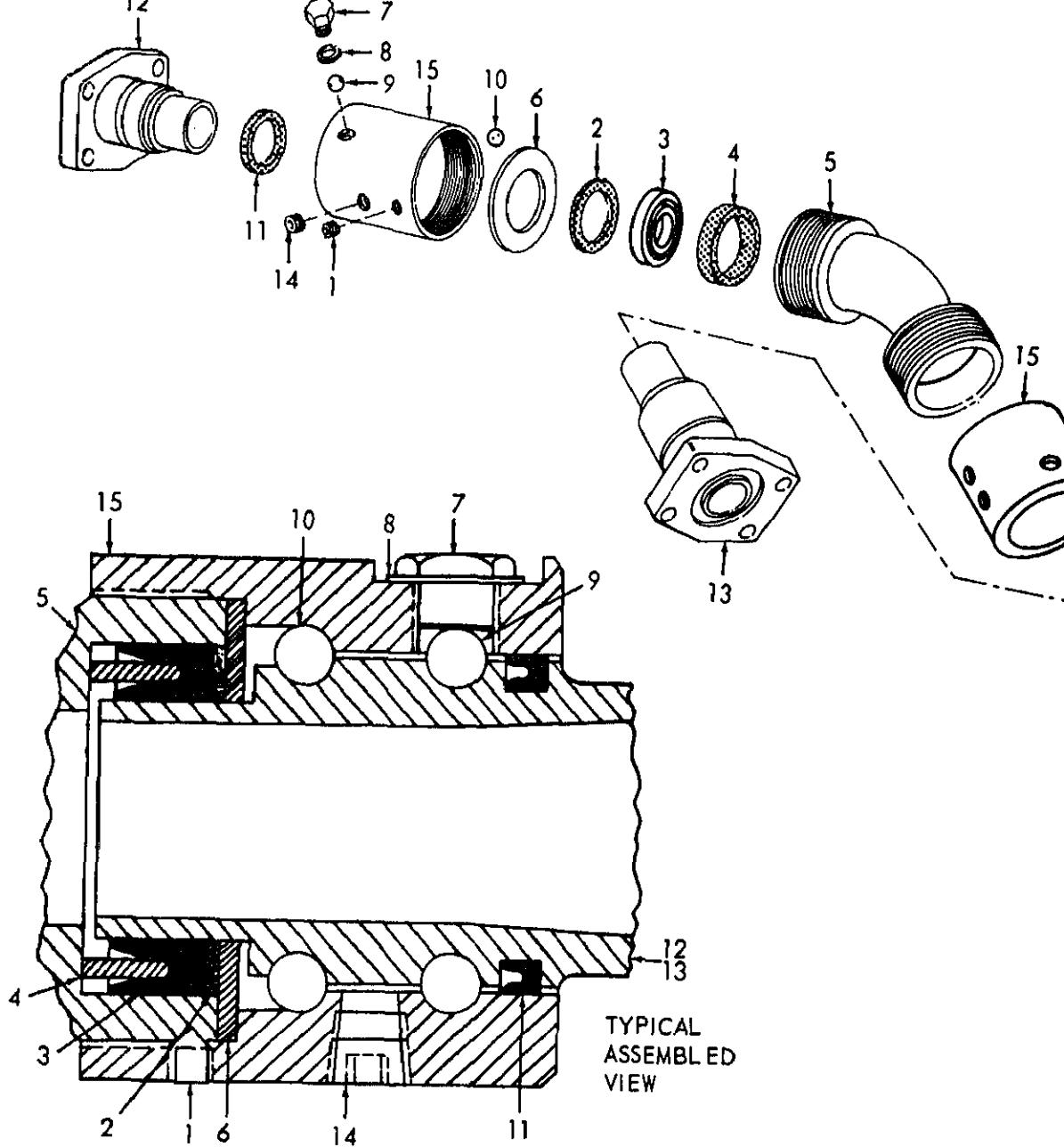
(1) Reassemble and install hydraulic line swivels and install coupling as illustrated in assembled view of figure 4-33. Before installing pipe plug (14), install grease fitting and install pipe plug (14) with MIL-G-3278 until grease appears at fitting. Use caution that balls are not displaced by installing pipe plug (14). Remove grease fitting and install pipe plug (14).

(2) Lips of dust seal (11) and U-cup



NOTE REMOVE HYDRAULIC LINES AND AIR LINES FROM TRACTOR UNIVERSAL COUPLER IN A SIMILAR MANNER.



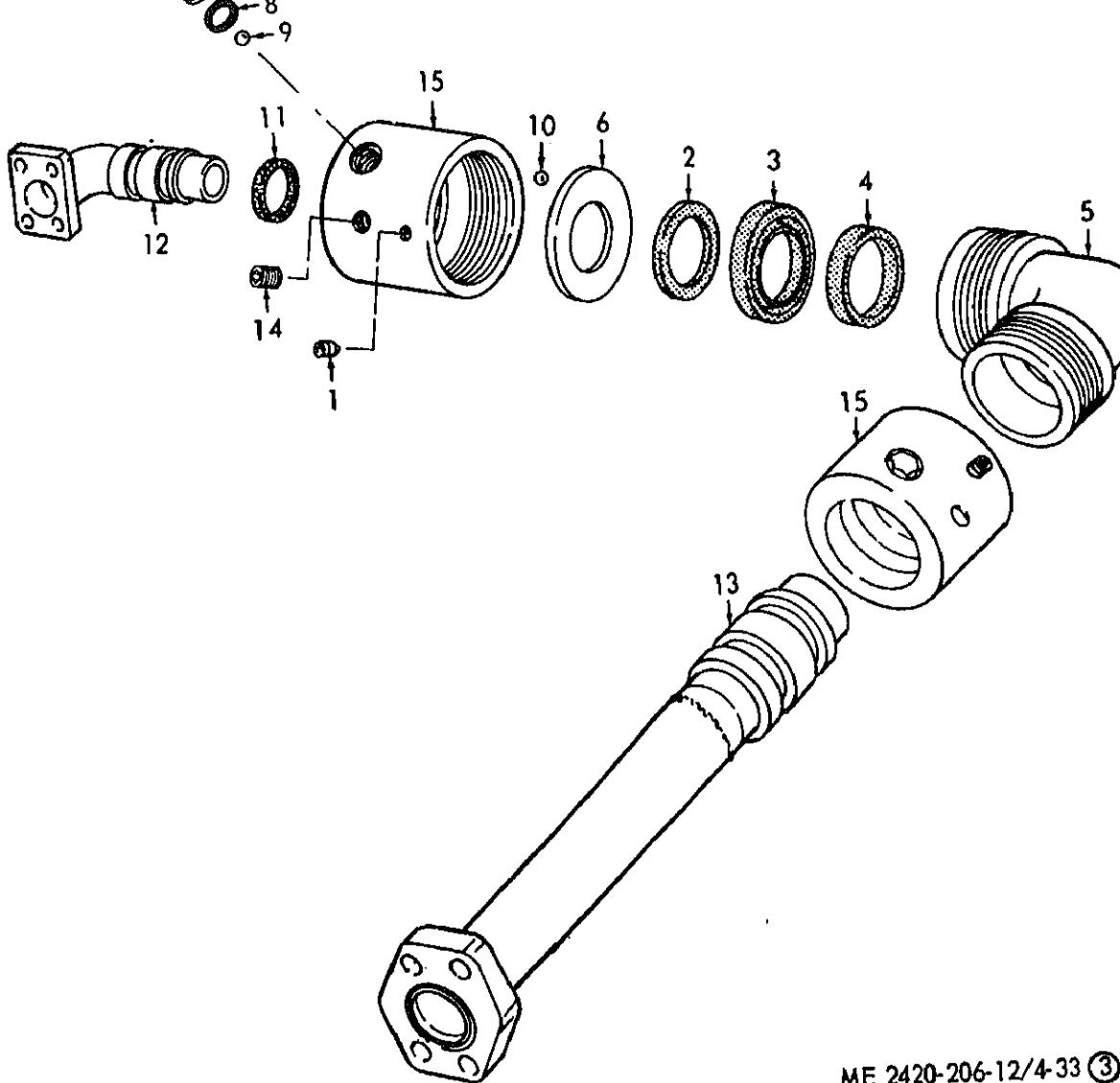


ME 2420-206-12/4-33 ②

1 Setscrew
 2 Ring
 3 Seal
 4 Spacer
 5 Retainer
 6 Ring
 7 Plug
 8 Washer

9 Bearing
 10 Bearing
 11 Seal
 12 Sleeve
 13 Sleeve
 14 Plug
 15 Casing

Figure 4-33. Swivels and hydraulic lines, removal, disassembly, reassembly, and installation (sheet 2 of 3).



ME 2420-206-12/4-33 (3)

1 Setscrew	9 Bearing
2 Ring	10 Bearing
3 Seal	11 Seal
4 Spacer	12 Sleeve
5 Retainer	13 Sleeve
6 Ring	14 Plug
7 Plug	15 Casing
8 Washer	

Figure 4-33. Swivels and hydraulic lines, removal, disassembly, reassembly, and installation (sheet 3 of 3).

4-4. Hydraulic Filter Base

a. Removal.

- (1) Remove element (para 3-7).
- (2) Remove hydraulic filter base, figure 4-34.

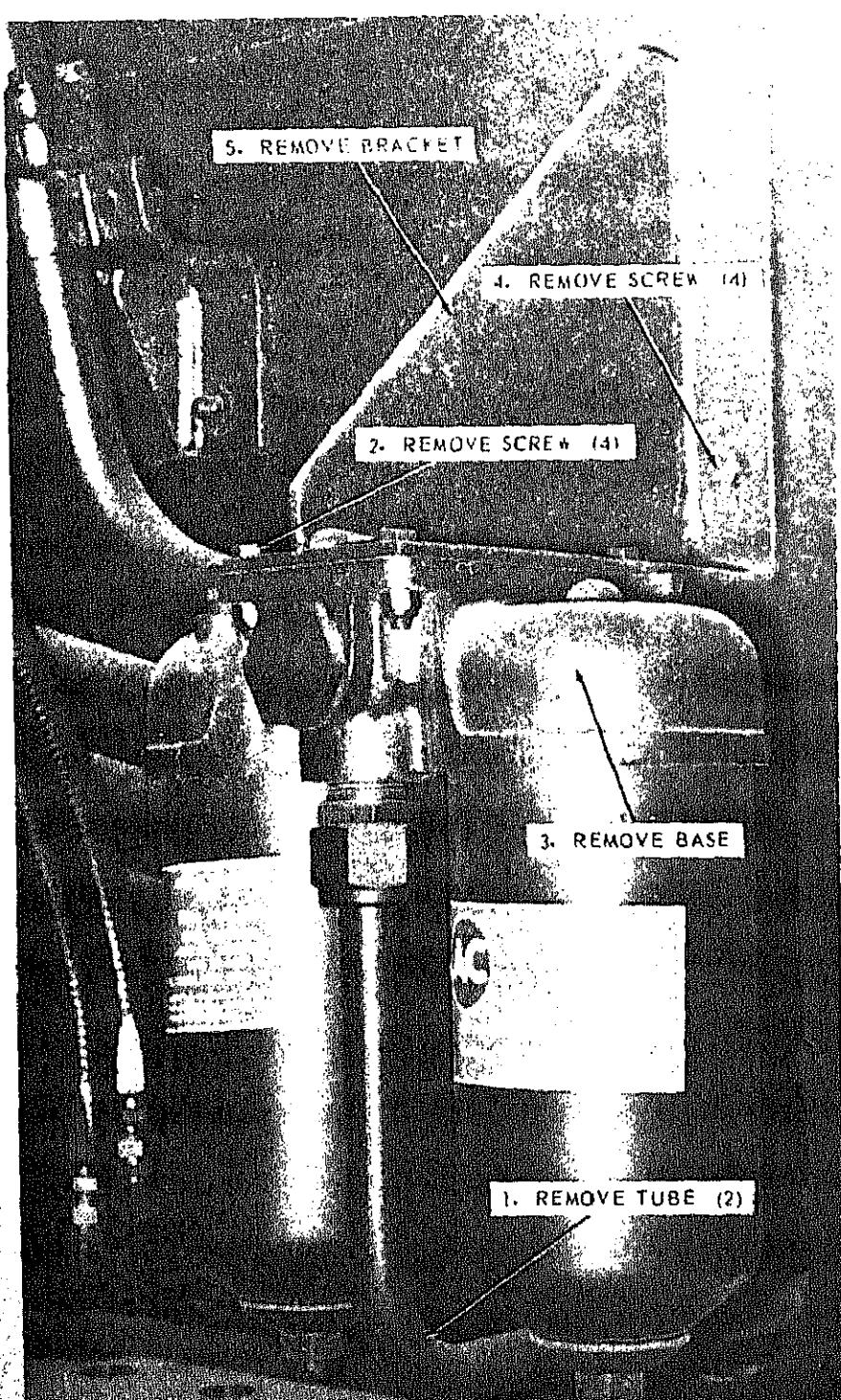
b. Cleaning and Inspection.

- (1) Clean parts and dry thoroughly.

damage. Replace defective parts as n

c. Installation.

- (1) Install hydraulic filter base i
- of removal, a above.
- (2) Install elements (para 3-7).



45. Push Start Pump and Valve

- a. Removal. Remove pump and valve as illustrated in figure 4-35.
- b. Cleaning and Inspection.
 - (1) Clean exterior and dry thoroughly.
 - (2) Inspect for cracks, breaks, and other damage.

age. Rotate pump input shaft and check for rough catching, or noisy operation. Replace defective parts as necessary.

- c. Installation. Install valve and pump as illustrated in figure 4-35. Replace push start pump gasket.

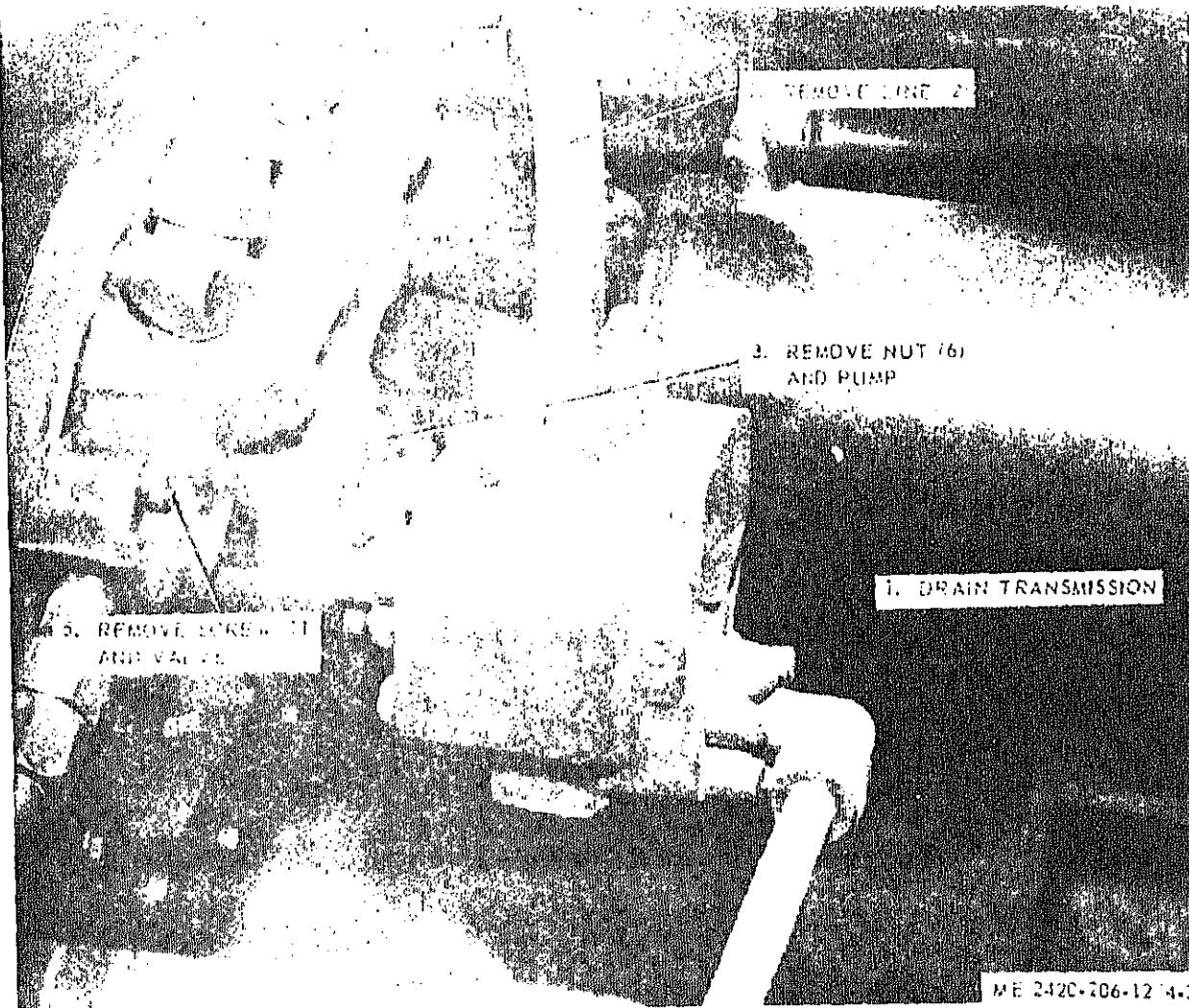


Figure 4-35. Push start pump and valve, removal and installation.

a. Removal and Disassembly. Remove and disassemble steering hydraulic cylinder as illustrated figure 4-36. Drain lines into a container. Lift and secure cylinder; do not damage piping. Remove nuts and anchor pins securing cylinder to tractor frame.

b. Cleaning and Inspection.

- (1) Clean parts and dry thoroughly.
- (2) Inspect for cracks, breaks and other damage.

wearing assembly, preformed packings, and seal.

c. Reassembly and Installation. Reassemble and install steering hydraulic cylinder as illustrated figure 4-36. Lubricate inside of cylinder bore with all packing with MIL-L-2104A oil. Torque nut (1) to 1,000 foot-pounds and capscrew (2) to 185 foot-pounds. Tighten capscrews (12) finger tight and install lockwire (11). Correct fluid level in hydraulic tank as necessary.

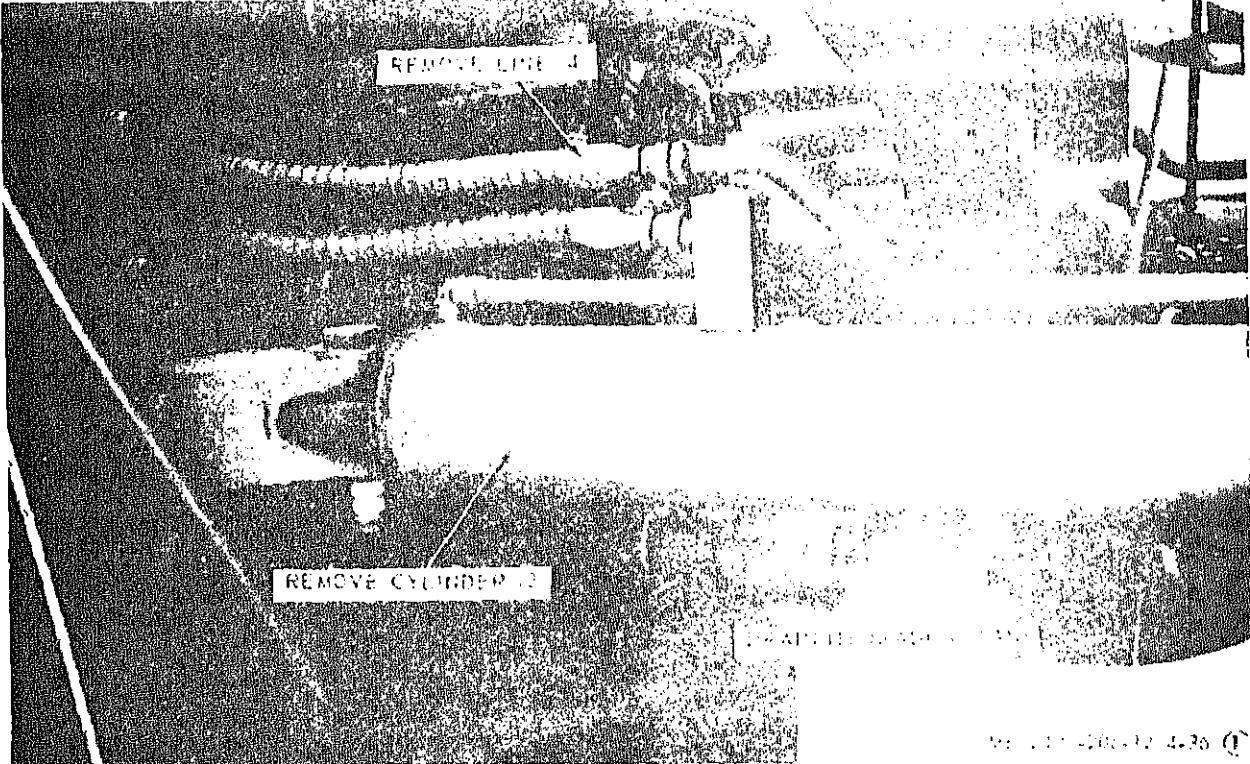
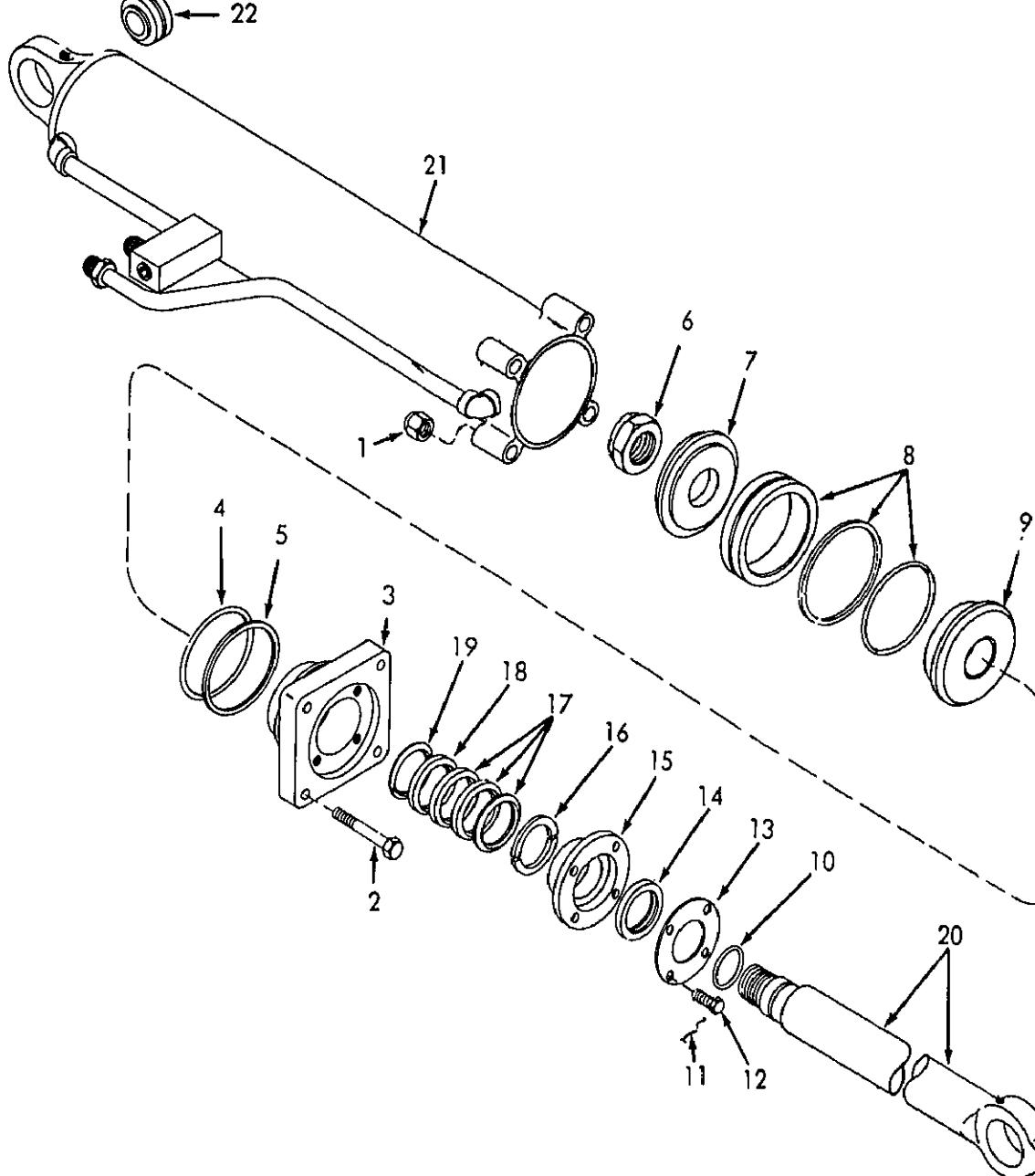


Figure 4-36. Steering hydraulic cylinder, removal, disassembly, reassembly and installation (sheet 1 of 2).



ME 2420-206-12

1 Nut
2 Screw
3 Cap
4 Packing
5 Ring
6 Nut
7 Piston
8 Wear ring assembly
9 Piston
10 Packing
11 Wire

12 Screw
13 Retainer
14 Seal
15 Gland
16 Adapter
17 Packing
18 Packing
19 Adapter
20 Rod
21 Tube assembly
22 Bearing (do not remove unless damaged)

a. Removal.

(1) Remove screws that secure floorplates, remove floorplates.

(2) Remove bulldozer hydraulic valve as illustrated in figure 4-37.

b. Cleaning and Inspection.

(1) Wipe valve with a cloth and dry thoroughly.

(2) Inspect for cracks, breaks and other damage. Replace defective valve and floorplates as necessary.

c. Installation.

(1) Install bulldozer hydraulic valve as illustrated in figure 4-37.

(2) Install floorplates.

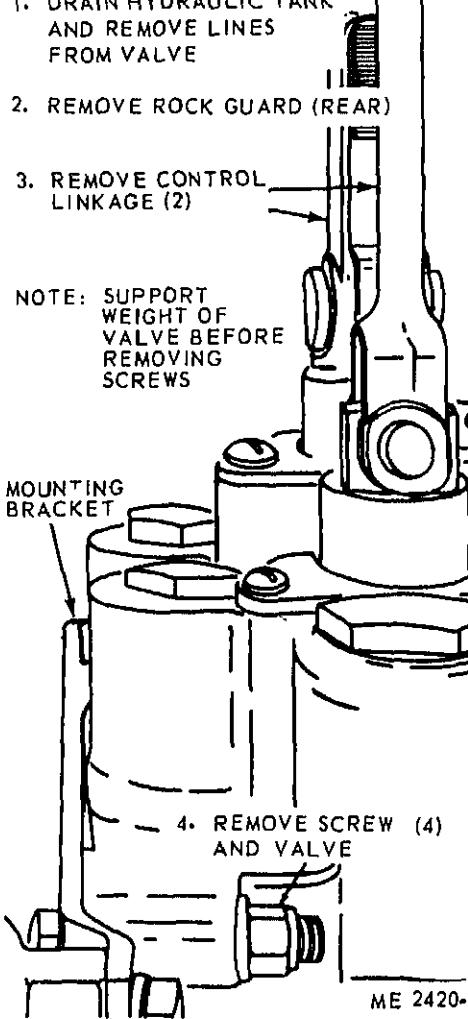


Figure 4-37. Bulldozer hydraulic valve, removal and installation.

4-48. Scraper Hydraulic Valve

- a. *Removal.* Remove scraper hydraulic valve as illustrated in figure 4-38.
- b. *Cleaning and Inspection.*
(1) Wipe parts and dry thoroughly.

- (2) Inspect for cracks, breaks and other age. Replace defective valve.
- c. *Installation.* Install scraper hydraulic valve as illustrated in figure 4-38.

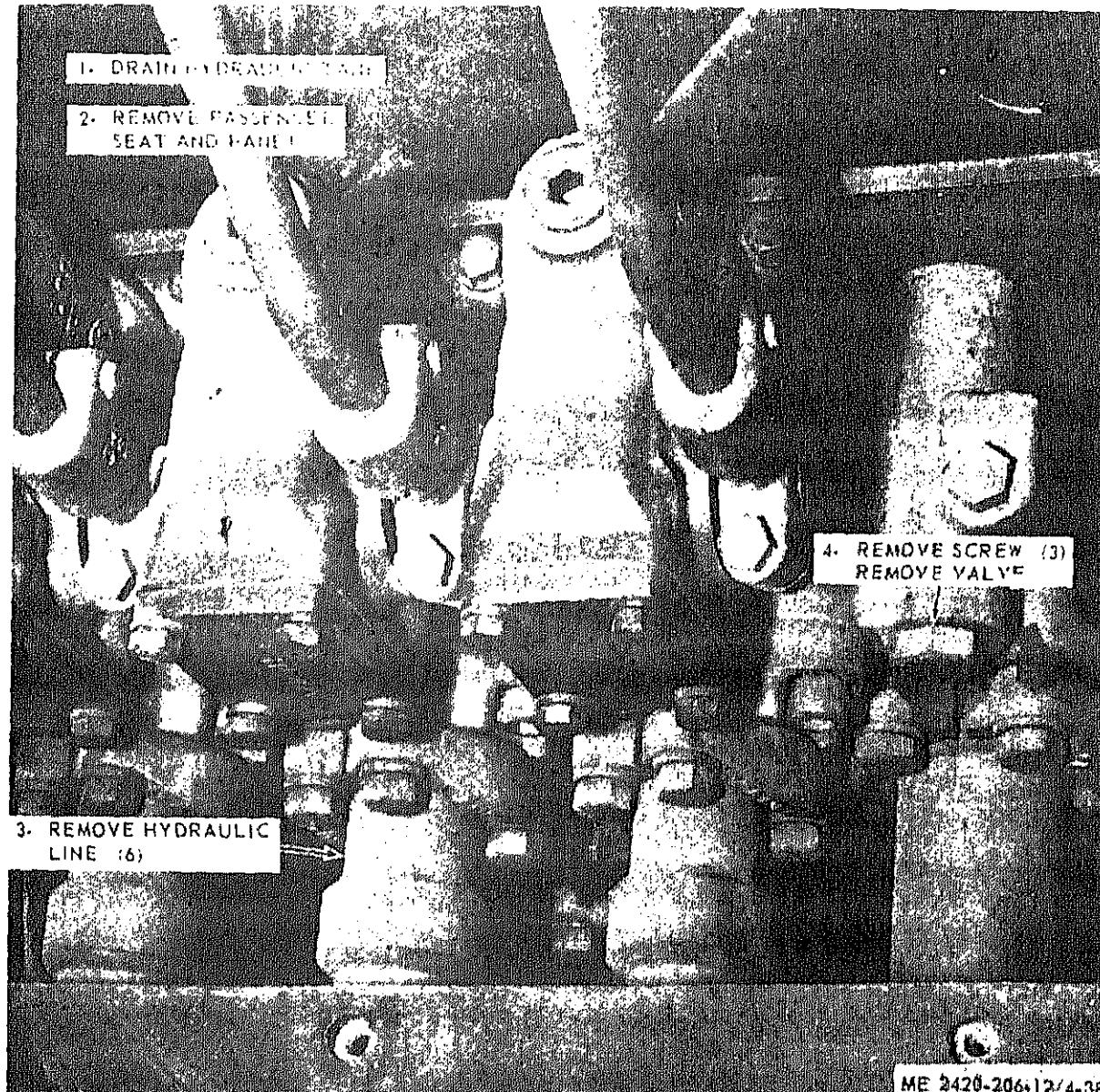


Figure 4-38. Scraper hydraulic valve, removal and installation.

ME 2420-206-12/4-38

Tractor air hydraulic system as contained in the tractor consists of tanks, valves, controls and accumulator, lines and fittings for application of controlled pressures to tractor and scraper wheel brakes.

4-50. Brake Actuator and Hydraulic Tank

a. Description. The brake system is an air-over hydraulic type, in which air is used to actuate the hydraulic brake cylinder to apply brakes. The brake actuator is an integrated unit which contains both air cylinder and hydraulic brake cylinder. As air from air brake system is ported to brake actuator, the push rod in air cylinder in the brake actuator extends and applies force to a hydraulic piston at end of push rod. This forces hydraulic fluid into brake expander tube in the wheel brake.

b. Removal and Disassembly. Remove and disassemble brake actuator and hydraulic tank as illustrated in figure 4-39.

(1) Brake actuator.

(a) Remove capscrews (1, Fig 4-39 (sheet 2 of 3)) and lockwashers (2) that secure cylinder (18) to mounting bracket (21). Apply air pressure to air brake chamber to actuate brake. While cylinder is extended away from mounting bracket (21), remove retaining ring (3) that secures push rod (19, Fig 4-39 (sheet 3 of 3)) to the piston (5, Fig 4-39 (sheet 2 of 3)); remove piston and associated parts from the push rod. Slowly release air pressure from chamber.

(b) Remove retaining ring (4) that secures piston (5) to cylinder (18). Slide piston out of cylinder and remove washer (6), retaining ring (7), flat washer (8), spring (9), and ball (10). Remove preformed packings (11 and 12) from piston.

(c) Install cylinder in a soft-jawed vise and remove cap (13) from cylinder (18); remove preformed packing (14) from cap. Remove piston assembly (15) and spring (16) from cylinder; remove preformed packing (17) from piston.

(d) Remove two nuts (19) and flat washers (20) from push rod (19, Fig 4-39 (sheet 3 of 3)). Remove nuts (1) and lockwashers (2) that secure mounting bracket (21, Fig 4-39 (sheet 2 of 3)) to brake chamber. Remove capscrews (4), lockwashers cover (7, Fig 4-39 (sheet 3 of 3)).

(e) Remove boot (3) from push rod (19). Use C-clamps to clamp cover (7) to body (20) of brake chamber. Remove capscrews (4), lockwashers (5), and flat washers (6) that secure cover to body. Carefully loosen C-clamps and remove cover from

clamps to brake chamber before removing cover. Cover may cause cover to be ejected with enough force to cause bodily injury.

(f) Remove two springs (8 and 9) and spring guide (10) from brake chamber.

(g) Remove nuts (11) and lockwashers (12) that secure outer clamp (13) to body (20). Remove push rod (19), diaphragm (17), and associated parts from body by pulling out the push rod.

(h) Straighten the rolled diaphragm and remove outer clamp (13). Remove nuts (14) and lockwashers (15) that secure inner clamp (16) and diaphragm guide (18) to push rod (19). Remove inner clamp and diaphragm guide. Remove diaphragm (17) from diaphragm guide.

(2) Hydraulic tank.

(a) Position a container under hydraulic tank. Disconnect tank-to-brake cylinder line fittings on tank. Allow lines and tank to drain.

(b) Remove four capscrews, washers, and nuts that secure tank to tractor frame; remove tank.

(c) Remove filler cap and breather from tank.

c. Cleaning and Inspection.

(1) Clean actuator and dry thoroughly.

Caution: Do not immerse piston assembly (15, Fig. 4-39 (sheet 2 of 3)) in cleaning solution as it will destroy the internal coated parts of piston.

Note. Discard all preformed packings.

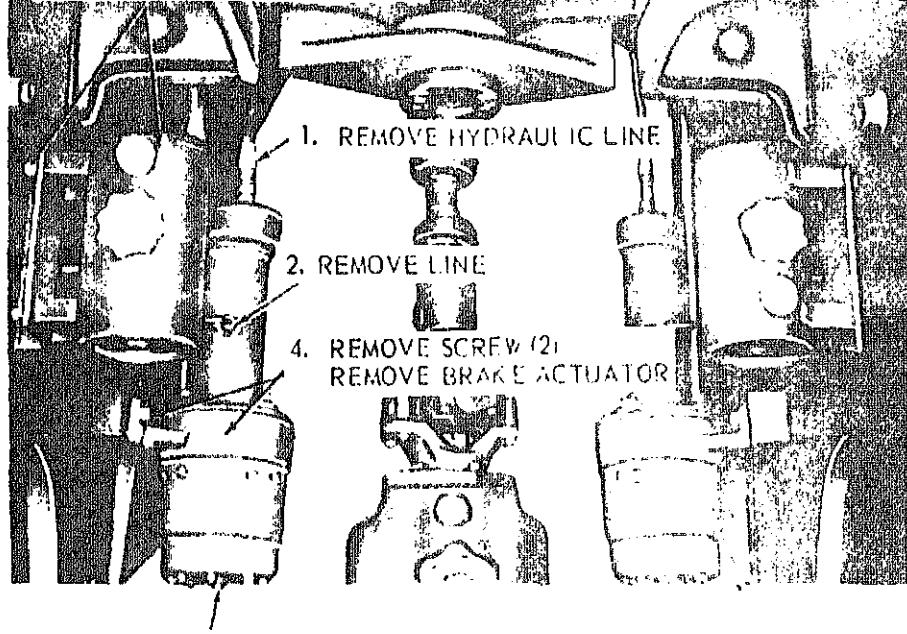
(2) Clean tank and dry thoroughly. Pour solvent into tank and agitate to remove sludge from interior. Immerse breather in solvent and agitate to remove dust and dirt. Shake out excess solvent.

(3) Inspect actuator and tank for cracks, breaks, and other damage. Check operation of actuator's piston assembly (15) by inserting a smooth, blunt tool into the small opening in the face of piston assembly and pushing forward. If definite movement cannot be easily obtained, replace piston assembly. If there is movement, apply low pressure compressed air at opening to produce a pressure inside piston assembly. If air passes through, replace piston assembly. Replace defective parts as necessary.

d. Reassembly and Installation. Install tank and actuator as illustrated in figure 4-39.

(1) Brake actuator.

(a) Lubricate inside of brake chamber body (20, Fig 4-39 (sheet 3 of 3)) and both sides



3. REMOVE AIR LINE

NOTE: REMOVE OTHER BRAKE ACTUATORS AND TANKS IN A SIMILAR MANNER.

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Figure 4-39. Brake actuator and hydraulic tank, removal, disassembly, reassembly and installation (sheet 1 of 3).

(b) Lay inner clamp (16) on a bench and position the small end of diaphragm (17) inside flange. Slide diaphragm guide (18) and push rod (19) down into the diaphragm, position them on bolts of the inner clamp, and secure with nuts (14) and lockwashers (15).

(c) Slide diaphragm assembly down into the outer clamp (13) and roll diaphragm back over fluted edge of outer clamp.

(d) Slide assembled push rod and diaphragm into body (20) and position it so bolts of the outer clamp pass through holes provided; secure assembled push rod and diaphragm with nuts (11) and lockwashers (12).

(e) Position spring guide (10) and springs (9 and 8) on push rod; position cover (7) over push rod and, using C-clamps, align cover so it can be secured with capscrews (4), lockwashers (5), and flat washers (6); secure cover. Position boot (3) on cover and push rod.

(f) Connect brake chamber to a 100 psi compressed air line; apply pressure. The push rod must move out quickly without binding. Release the

(g) Cover boot (3) and cover (7) with suds and apply air pressure to brake chamber. If leakage is observed or operation of brake chamber is not quick and smooth, mantle brake chamber and check for cause of faulty operation.

(h) Lubricate bore of cylinder (18, Fig. (sheet 2 of 3)) with MIL-L-2104A, Amendment 1, Grade 10. Insert spring (16) into bore of cylinder.

Caution: Do not use automotive brake fluid in this brake system. Automotive brake fluid will cause deterioration of rubber parts and greatly shorten the effective life of unit.

(i) Lubricate and place preformed pack (17) on piston assembly (15); insert piston assembly into cylinder (18). Position preformed packing in cap (13), turn cap onto the cylinder, and torque to 50 foot-pounds minimum.

(f) Position ball (10), spring (9), and washer (8) in the piston (5) and secure with retainer ring (7). Lubricate preformed packings (11).

Into cylinder slot provided.

Note. The preformed packing (11) is identified by a white paint slash on its outside diameter. This preformed packing must be positioned in the correct groove for proper operation of the hydraulic brake cylinder.

(k) Position mounting bracket (21) on brake chamber cover (7, Fig 4-39 (sheet 3 of 3)); secure with lockwashers (2) and nuts (1). Place flat washer (20, Fig 4-39 (sheet 2 of 3)) and nuts (19) on push rod (19, Fig 4-39 (sheet 3 of 3)) so there is a distance of 9/16 inch between the face of washer and mounting bracket. When this distance has been attained, tighten the two nuts together to lock them in place.

(1) Position washer (6, fig 4-39 (sheet 2 of 3)) in the piston (5). Apply 100 psi air pressure to actuate brake chamber. While push rod (19, fig 4-39 (sheet 3 of 3)) is extended, slide assembled hydraulic brake cylinder on push rod so the nuts (19, fig 4-39 (sheet 2 of 3)) are up tight against flat washer (20); secure piston to the push rod by installing retaining ring (3) in the piston.

(m) Release air pressure from brake chamber and secure cylinder (18) to mounting bracket (21) with four capscrews (1) and lockwashers (2).

(2) *Hydraulic tank.*

(a) Fill hydraulic tank, LO 5-2420-206-12 and bleed brake system as follows:

Caution: Do not fill brake system with automotive brake fluid. This type of fluid is destructive to brake assemblies and hydraulic brake cylinders.

(b) Depress and hold brake treadle valve. Open bleeder valve to vent air from hydraulic brake cylinder. When no more fluid flows from bleeder, close and release brake treadle valve.

(c) Wait 2 minutes to permit hydraulic brake cylinder to fill; then check and refill the

(d) Repeat (b) and (c) above.

(e) Actuate and hold brake for 10 seconds with bleeder closed; Wait 2 minutes, refill the brake reservoir and repeat this step.

(f) Repeat (b) and (c) above to check for air in the cylinder and from expander tube. Re-bleeding the cylinder can be detected by air escaping from bleed ports.

Note. Wait 2 minutes after each break in the application.

(g) Repeat (e) above enough times so that brake shoes are contracting the Test by holding against engine power.

(h) Move to the bleeder for the assemblies and repeat above procedure

(i) After operating tractor for a 1 hour, open bleeders, with brakes release any remaining air which may top of system during use.

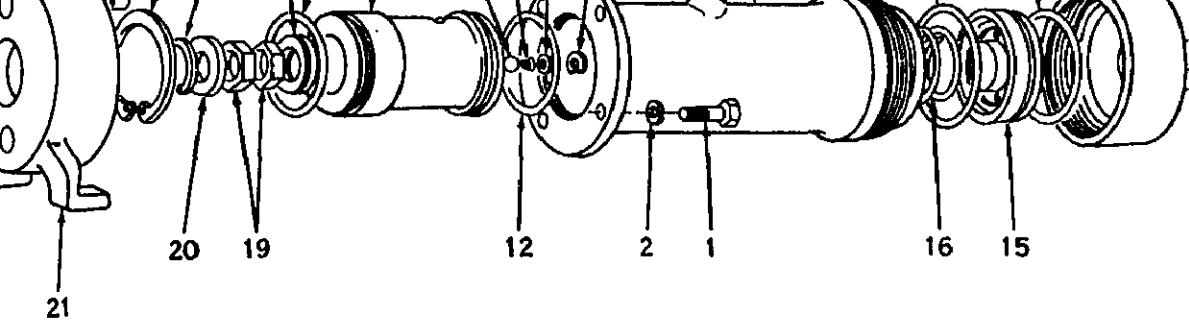
(j) Operational Inspection

1. Inspect daily to insure the assembly mounting nuts have not loosened. Turn nuts with a torque wrench set at 270 foot-pounds if loose. Check for binding springs.

2. Inspect weekly for lining
spect for wear, apply brakes and vis
retracting spring on inside of brake
brake shoes tend to shear the retracting
a point between frame and shoes, the
maximum and brake blocks should be re

Caution: Continued operation of the tractor in this condition will result in damage to the brake structure.

3. Inspect weekly for dirt between expander tube and brake assembly. If excess dirt is found that would impair the operation of the brakes, refer to direct support maintenance.

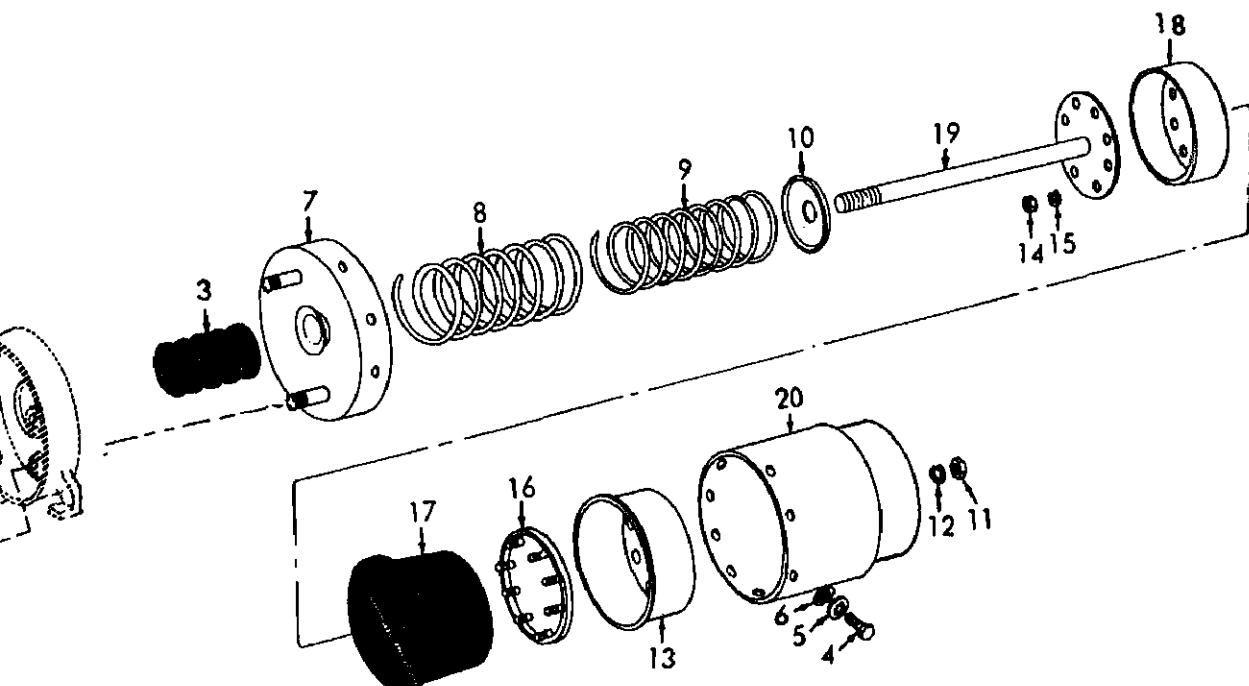


apscrew
 lockwasher
 retaining ring
 retaining ring
 piston
 Vasher

7 Retaining ring
 8 Flat washer
 9 Spring
 10 Ball
 11 Preformed packing
 12 Preformed packing
 13 Cap
 14 Preformed packing
 15 Piston assembly
 16 Spring
 17 Preformed packing
 18 Cylinder

ME 2420-206-12/4-39 ②
 19 Nut
 20 Flat washer
 21 Mounting bracket
 22 Bearing

Figure 4-39. Brake actuator and hydraulic tank, removal, disassembly, reassembly and installation (sheet 2 of 3).



Nut
 Lockwasher
 Boot
 Capscrew
 Lockwasher

6 Flat washer
 7 Cover
 8 Spring
 9 Spring
 10 Spring guide
 11 Nut
 12 Lockwasher
 13 Outer clamp
 14 Nut
 15 Lockwasher
 16 Inner clamp
 17 Diaphragm
 18 Diaphragm guide
 19 Push rod
 20 Body

Figure 4-39. Brake actuator and hydraulic tank, removal,

ME 2420-206-12/4-39 ③

Brake relay air valve

a. *Removal.* Remove brake relay air valve as illustrated in figure 4-40.

b. *Cleaning and Inspection.*

(1) Clean with a cloth and dry thoroughly.

(2) Inspect parts for cracks, breaks and damage. Replace defective parts as necessary.

c. *Installation.* Install brake relay air valve as illustrated in figure 4-40.

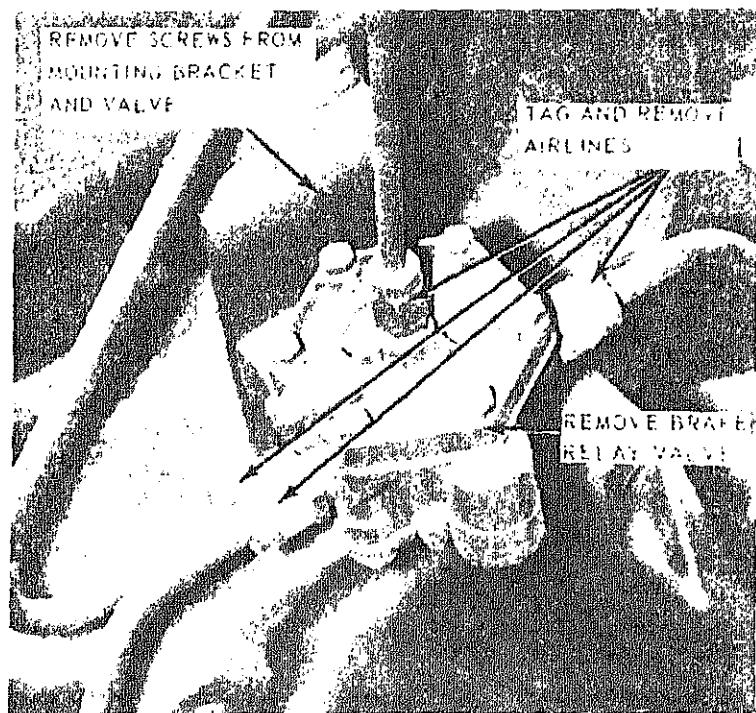


Figure 4-40. Brake relay air valve, removal and installation.

4-52. Check and Protection Valves and Stoplight Switch

a. *Removal.* Remove check and protection valves and stoplight switch as illustrated in figure 4-41.

b. *Cleaning and Inspection.*

- (1) Clean all parts and dry thoroughly.
- (2) Inspect parts for cracks, breaks and other damage. Replace defective parts as necessary.

c. *Installation.* Install parts as illustrated in figure 4-41.

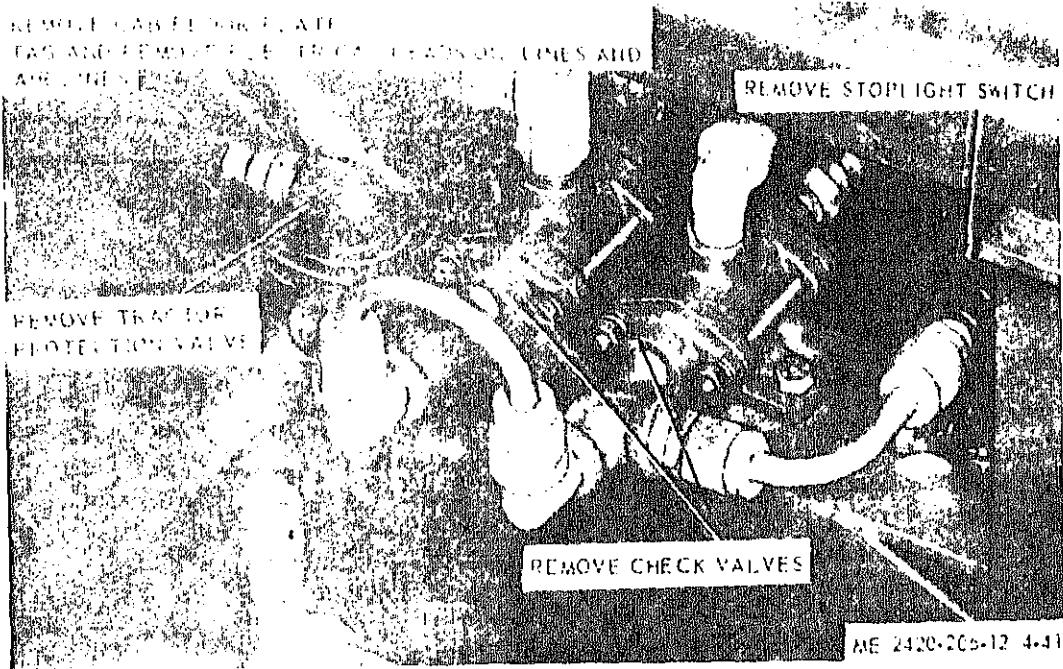


Figure 4-41. Check and protection valves and stoplight switch, removal and installation.

b. Cleaning and Inspection.

(1) Clean all parts and dry thoroughly. Flush

c. Installation. Install air reservoirs as illustrated in figure 4-42. Check for air leaks.

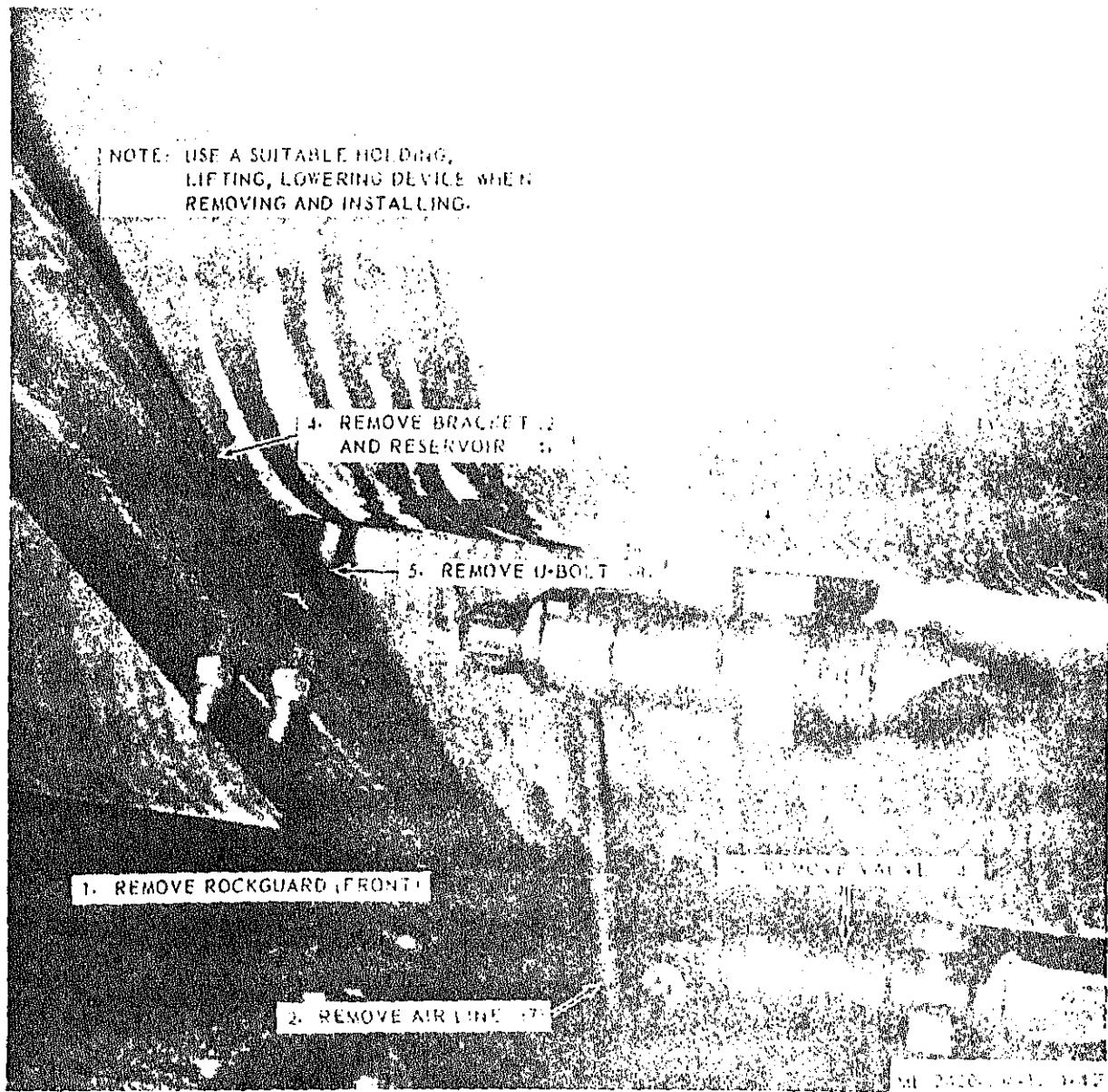


Figure 4-42. Air reservoirs, removal and installation.

4-54. Air Horns

a. Removal. Remove air horns as illustrated in figure 4-43.

b. Cleaning and Inspection.

(1) Wipe parts with a cloth and dry thoroughly.

(2) Inspect for cracks, breaks and damage. Replace defective parts as necessary.

c. Installation. Install air horns as illustrated in figure 4-43.

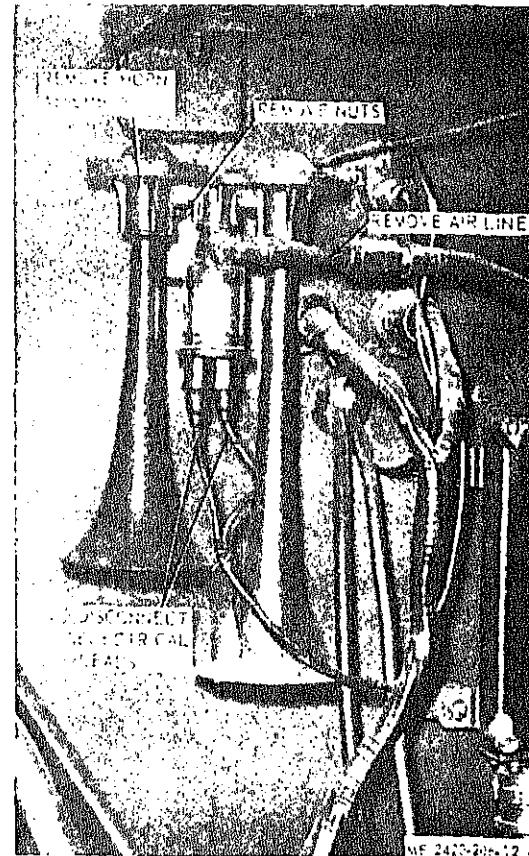


Figure 4-43. Air horns, removal and installation.

Windshield Wiper Motor

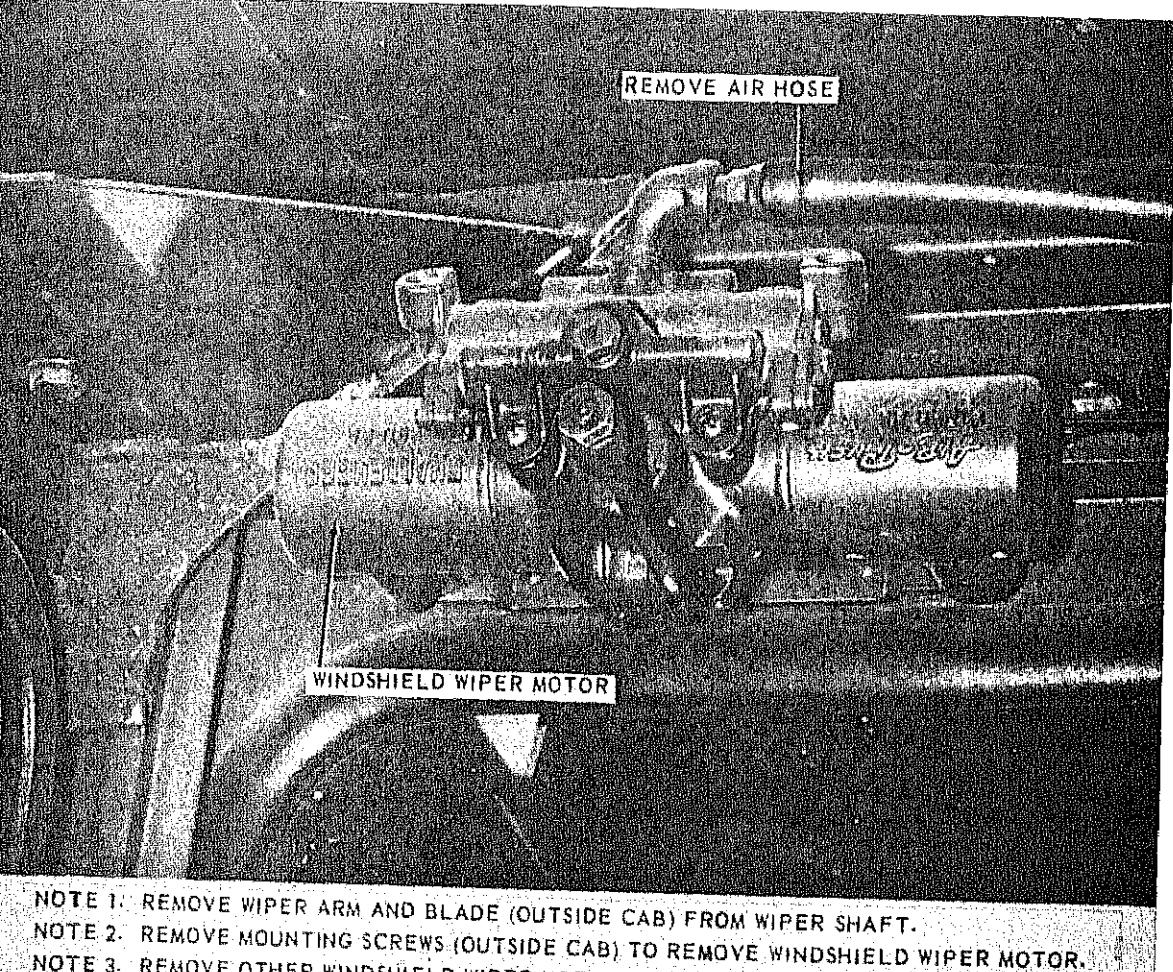
Removal. Remove windshield wiper motor as illustrated in figure 4-44.

Cleaning and Inspection.

1) Clean parts and dry thoroughly.

(2) Inspect for cracks, breaks and other damage. Replace defective windshield wiper motors as necessary.

c. *Installation.* Install windshield wiper motors as illustrated in figure 4-44.



ME 2420-206-12/4-44

Figure 4-44. Windshield wiper motor, removal and installation.

Tractor components contained in this section consist of items not listed in any other section.

4-57. Propeller Shaft

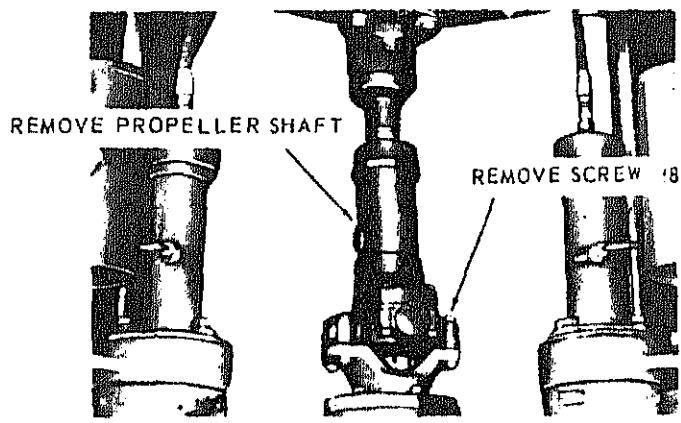
a. Removal. Remove propeller shafts as illustrated in figure 4-45. Compress shaft and remove from tractor, tap bearings with a soft hammer if necessary, to release them. Take care not to loose rollers from bearings.

b. Cleaning and Inspection.

(2) Inspect for cracks, breaks and damage. Replace defective propeller shafts if necessary.

(3) Lubricate Midmount bearing, move the inside front of rear frame unit, drive propeller shaft from the transmission and drive propeller shaft to the rear axle. Refer to LC.

c. Installation. Install propeller shafts as illustrated in figure 4-45. Replace seals, lubricate side of bearing to retain the rollers.



RE MOVE OTHER PROPELLER SHAFTS IN A SIMILAR MANNER.

ME 2420-206-12

Figure 4-45. Propeller shaft, removal and installation.

3. LOOSEN SCREW
REMOVE TERMINAL
4. REMOVE
RETAINER (2)

5. REMOVE
RETAINER (2)

4. REMOVE WINGNUT
AND WASHER (19)

6. REMOVE
RETAINER

CC. Battery Box and Fender

a. Removal and Disassembly.

- (1) Remove batteries (para 4-59).
- (2) Remove and disassemble battery box and fender as illustrated in figure 4-48.

b. Cleaning and Inspection.

(1) Clean battery box with a solution of water and baking soda to neutralize any acid that may have spilled on the parts. Clean parts and dry thoroughly.

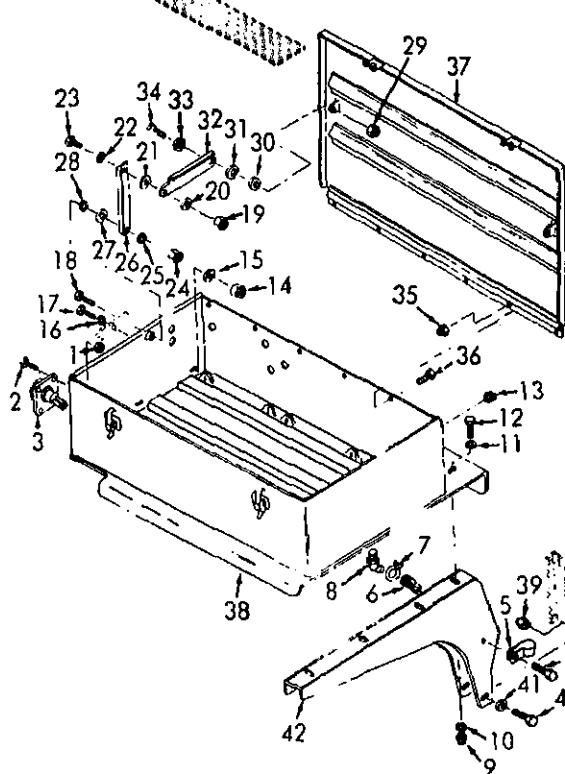
(2) Inspect for cracks, breaks and other damage. Replace defective parts as necessary.

c. Reassembly and Installation.

(1) Reassemble and install battery box and fender as illustrated in figure 4-48.

(2) Install batteries (para 4-59).

Note. Tool box and fender mounted on the left side of tractor is removed and installed in a similar manner as the battery box and fender.



ME 2420-206-12

1	Nut	22	Washer
2	Screw	23	Screw
3	Receptacle	24	Nut
4	Screw	25	Washer
5	Clip	26	Arm
6	Hose	27	Washer
7	Clamp	28	Washer
8	Fitting	29	Nut
9	Nut	30	Washer
10	Washer	31	Washer
11	Washer	32	Arm
12	Screw	33	Washer
13	Grommet	34	Screw
14	Nut	35	Nut
15	Washer	36	Screw
16	Washer	37	Cover
17	Screw	38	Box and fender asse
18	Screw	39	39 Nut
19	Nut	40	Screw
20	Washer	41	Washer
21	Washer	42	Bracket

Figure 4-48. Battery box and fender, exploded view

4-61. Rear Fenders

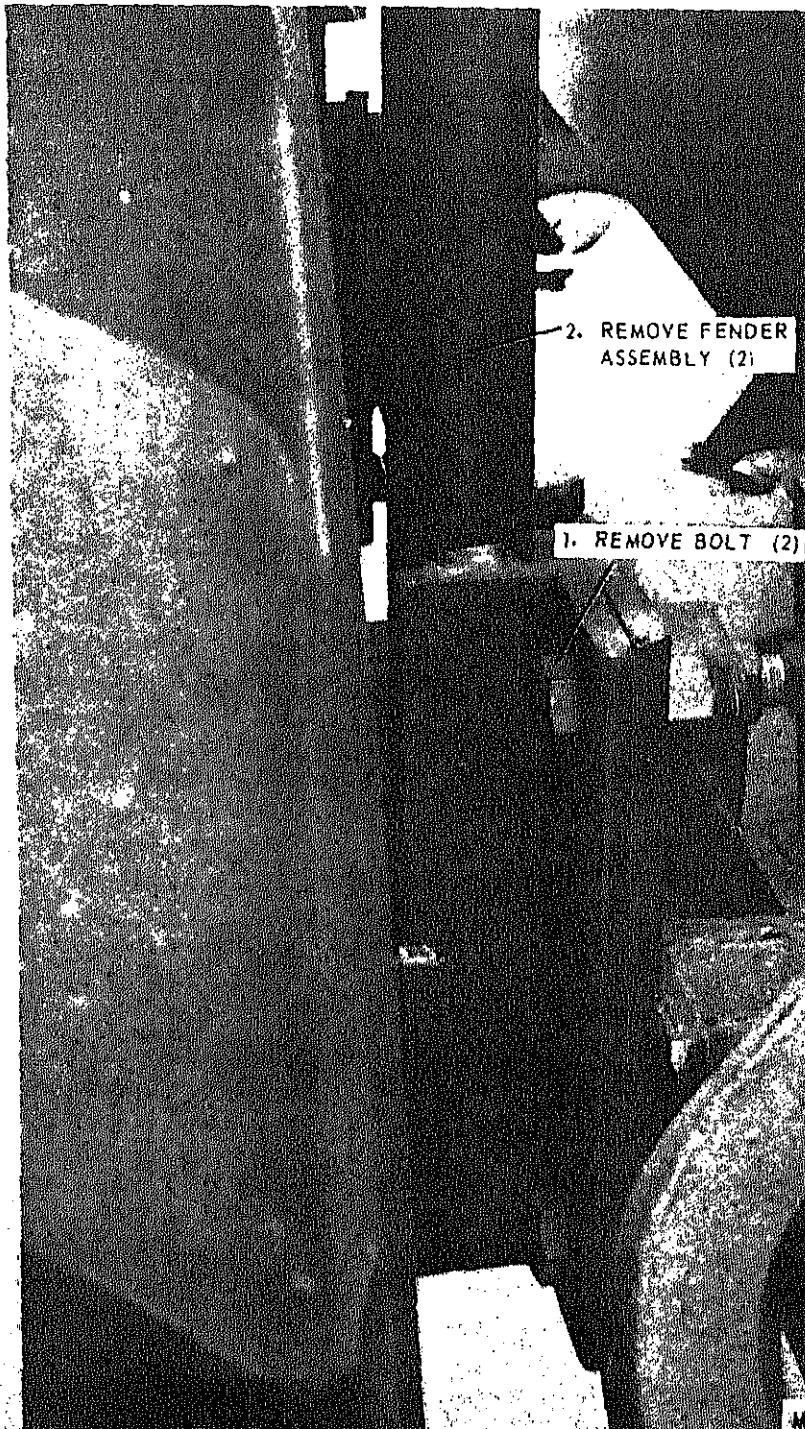
a. Removal. Remove rear fenders from tractor as illustrated in figure 4-49.

b. Cleaning and Inspection.

(1) Clean parts and dry thoroughly.

(2) Inspect for cracks, breaks and damage. Replace unrepairable defective rear fenders necessary.

c. Installation. Install rear fenders as illustrated in figure 4-49.



a. Removal.

(1) Remove capscrew and flat washer securing operator's seat belt and backrest to shell. Remove capscrew securing seat cushion to shell. Remove capscrew and nut securing shell to seat support. Remove passengers seat in a similar manner.

(2) Remove seat support as illustrated in figure 4-50.

b. Disassembly. Disassemble seat support as illustrated in figure 4-51.

c. Cleaning and Inspection.

(1) Clean parts and dry thoroughly.

(2) Inspect for cracks, breaks and other damage. Replace defective parts as necessary.

d. Reassembly. Reassemble seat support in reverse order of disassembly (fig 4-51).

e. Installation. Install seat support as illustrated in figure 4-50. Install seats and seat belts in reverse procedure of *a* above.

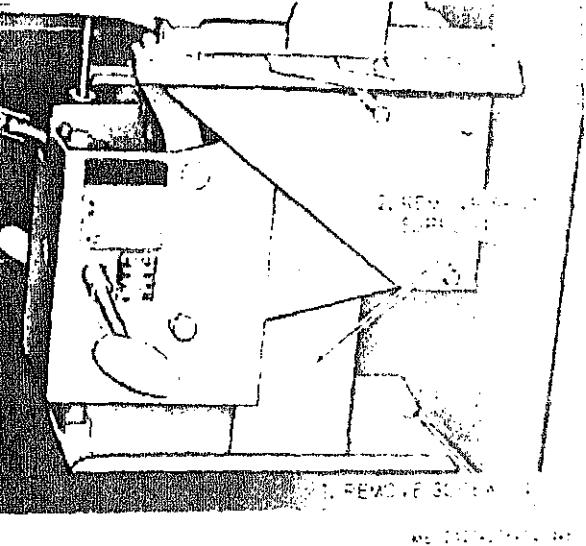


Figure 4-50. Seat support, removal and installation.

63. Tires and Wheels

a. Tire Pressure. For normal services, tires are inflated to 45 psi at both front and rear. For operation on soft earth, reduce tire pressure to 35 psi to improve traction. For operation on hard surfaced roads, increase tire pressure to 50-55 psi for less resistance and tire wear.

b. Tire Inspection. Inspect tires daily for imbedded stones, nails, or metallic particles. Remove im-

Replace missing valve caps.

c. Ballast Inflation. Each tire is provided with a hydro-inflation connector so that the tires can be filled with a calcium chloride solution to add ballast to the vehicle. The fill hole (fig 4-52) is large enough so that the plug can be removed and a hose inserted to remove all ballast from the tire without removing the tire.

d. Tire and Wheel Removal.

(1) Set parking brake. Jack up the wheel and block securely under the axle. Deflate tire. If tires are filled with ballast solution, drain through the hydro-inflator. Insert a hose into the drain port to drain all ballast from tire.

(2) Remove driver (6, fig 4-53) from wheel. Locate joint of lockring (7) and pry out lockring that locks bead seat ring to the wheel assembly. Remove flange (10) and bead seat ring (9).

Warning: Stand aside when removing lockring from tire. The lockring may snap out with enough force to cause injury.

(3) Remove tire (11), preformed packing (8) and second flange (12) from wheel (13).

(4) Remove air valve parts (1 through 5 and 14).

e. Cleaning and Inspection.

(1) Discard all preformed packings. Clean tire, wheel, and flanges with water. Remove grease and gummy deposits from metallic parts with solvent and dry thoroughly. Scrape grease from tire.

(2) Clean all other parts and dry thoroughly.

(3) Inspect outside of tires for cuts, tears, imbedded stones, or metallic particles. Remove stones or metallic particles. Skive around cuts to prevent further tearing.

(4) Inspect inside of tire for sharp projections, cuts, or ruptured cords. Inspect tire bead to make sure it is smooth and will provide a good air seal.

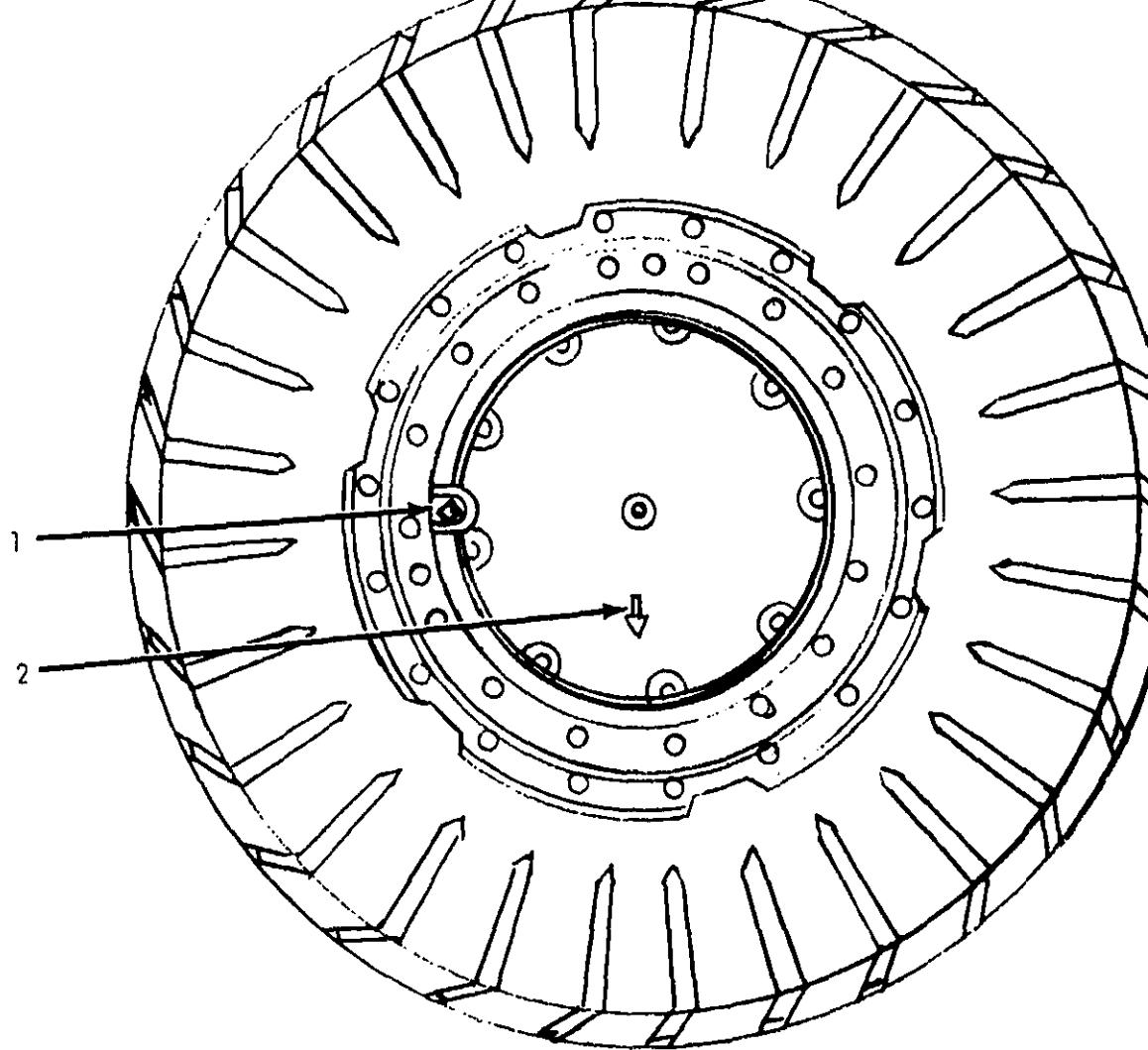
(5) Inspect wheel assembly, flanges, bead seat rings, and lockrings for cracks, distortion, gouges or burrs. Remove burrs with a stone or file.

(6) Inspect air valve parts and hydro-inflation connector parts for cracks, damaged threads, distortion, or other damage. Replace all damaged parts.

f. Tire Repair. For tubeless tire repair procedures, refer to TM 9-1870-1.

g. Installation. Install tire and wheel in reverse order of removal given in figure 4-53.

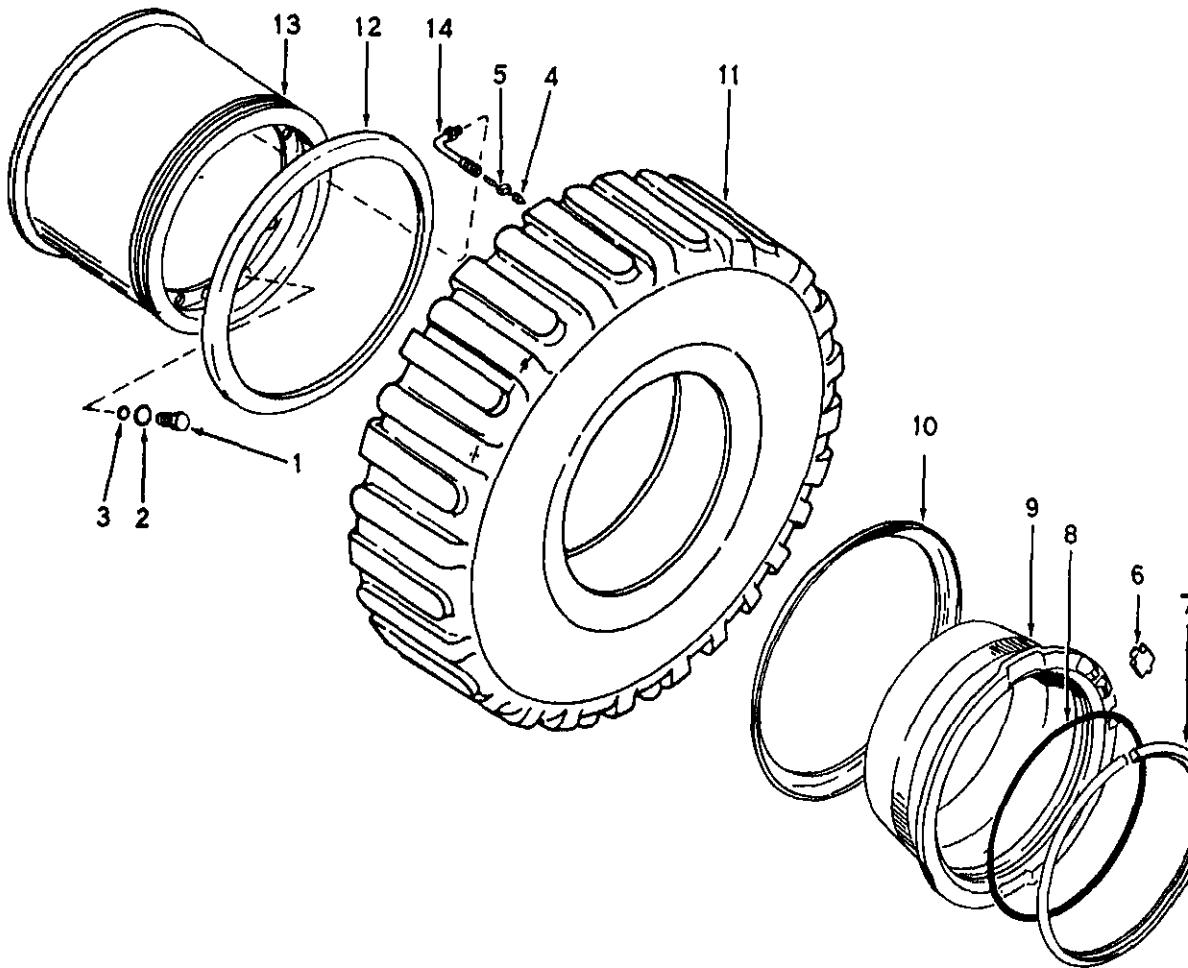
Note. Torque nuts to 650 ft.-lb. Check wheel nuts weekly.



ME 2420-206-12/4-5

- 1 Final drive fill and drain plug
- 2 Fill arrow

Figure 4-52. Wheel hub showing fill and drain plug.



ME 2420-206-12/4

1 Connector plug	8 Preformed packing
2 Preformed packing	9 Bead seat ring
3 Preformed packing	10 Flange
4 Valve cap	11 Tire
5 Core	12 Flange
6 Driver	13 Wheel
7 Lockring	14 Valve stem

Figure 4-53. Tire and wheel, removal and installation.

PINTLE HOOK

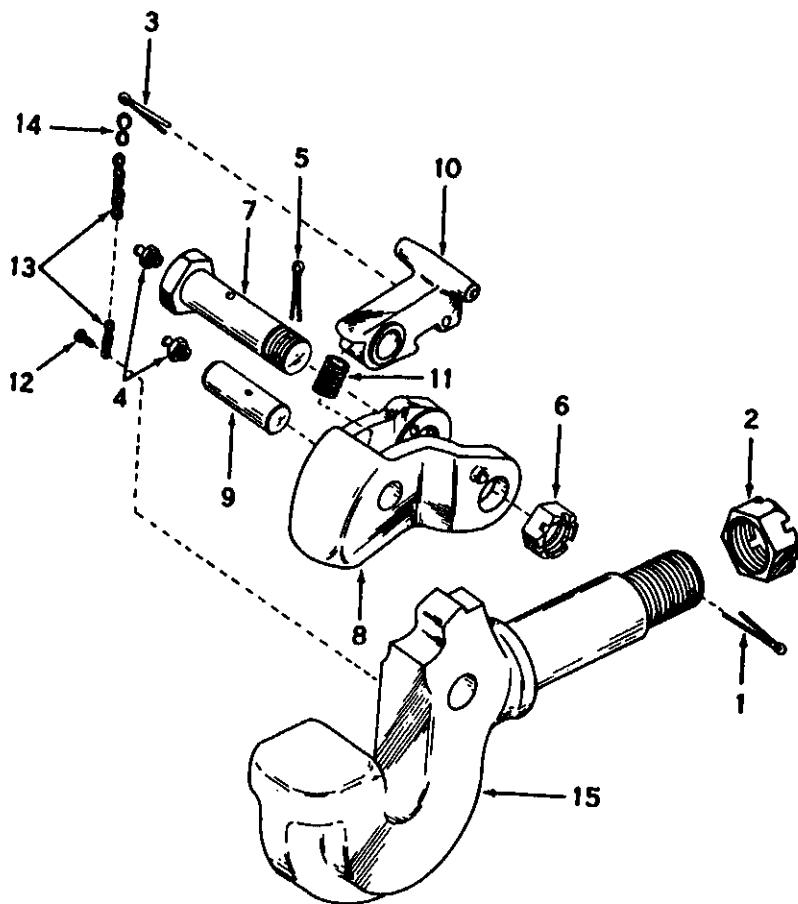
a. Removal and Disassembly. Remove pintle hook from tractor rear frame and disassemble as illustrated in figure 4-54.

b. Cleaning and Inspection.

(1) Clean all parts and dry thoroughly.

(2) Inspect for cracks, breaks and other damage. Replace defective parts.

c. Reassembly and Installation. Reassemble and install pintle hook on rear tractor frame as illustrated in figure 4-54.



ME 2420-206-12/4-54

1 Cotter pin
2 Nut
3 Cotter pin
4 Lubrication fitting
5 Cotter pin
6 Nut
7 Latch bolt
8 Lock

9 Latch pin
10 Latch
11 Spring
12 Drive screw
13 Chain
14 S-hook
15 Pintle

Figure 4-54. Pintle hook, removal, disassembly, reassembly, and installation.

55. Lunette

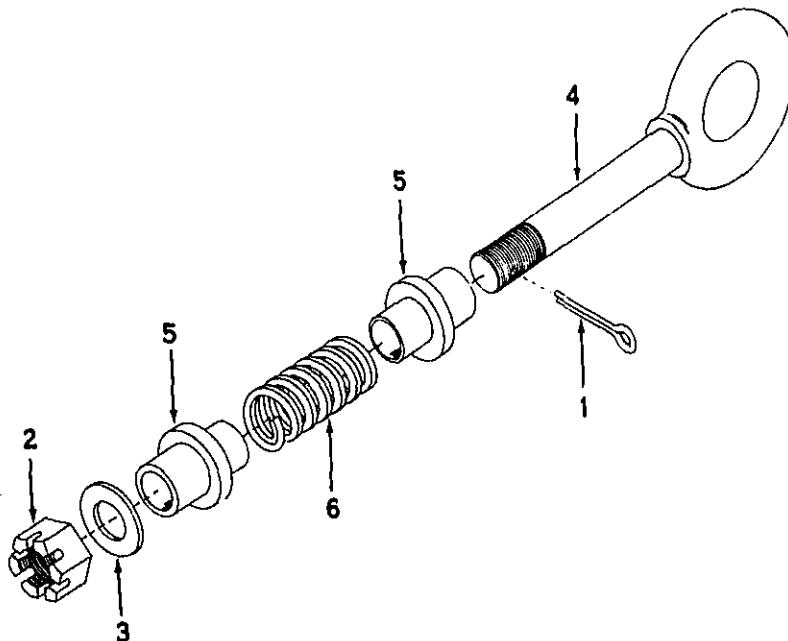
a. *Removal and Disassembly.* Remove lunette from center rock guard and disassemble as illustrated in figure 4-55.

b. *Cleaning and Inspection.*

(1) Clean parts and dry thoroughly.

(2) Inspect for damage. Replace damaged parts.

c. *Reassembly and Installation.* Reassemble and install lunette on center rock guard as illustrated in figure 4-55.



ME 2420-206-12/4-55

- 1 Cotter pin
- 2 Nut
- 3 Washer
- 4 Lunette
- 5 Sleeve
- 6 Spring

Figure 4-55. Lunette, removal, disassembly, reassembly, and installation.



APPENDIX A REFERENCES

Fire Protection

5-4200-200-10 Hand Portable Fire Extinguishers for Army Users

Lubrication

001L Fuels, Lubricants, Oils and Waxes
5-2420-206-12 Lubrication Order

Painting

9-213 Painting Instructions for Field Use

Maintenance

9-1870-1 Care and Maintenance of Pneumatic Tires
ORD-651 Use of Antifreeze Solutions and Cleaning Compounds in Engine Cooling Systems
38-750 Army Equipment Record Procedures
5-2420-206-20P Operator and Organizational Repair Parts
9-6140-200-15 Storage Batteries, Lead Acid Type

Equipment and Storage

38-230 Preservation, Packaging, and Packing of Military Supplies and Equipment
740-93-2 Preservation of USAMEC Mechanical Equipment for Shipment and Storage
740-90-1 Administrative Storage of Equipment
750-244-3 Procedures for Destruction of Equipment to Prevent Enemy Use

APPENDIX B

BASIC ISSUE ITEMS LIST

Section 1. INTRODUCTION

B-1. Scope

This appendix lists items which accompany the tractor or are required for installation, operation, or operator's maintenance.

B-2. General

This Basic Issue Items List is divided into the following sections:

a. *Basic Issue Items — Section II.* A list of items which accompany the tractor or are required for the installation, operation, or operator's maintenance.

b. *Maintenance and Operating Supplies — Section III.* A listing of maintenance and operating supplies required for initial operation.

B-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items, Section II.

a. *Source, Maintenance, and Recoverability Codes (SMR), Column (1):*

(1) Source code indicates the selection status and source for the listed item. Source codes are:

Code	Explanation
C	Applied to repair parts which are stocked in or supplied from CSA/DSA or Army supply system, and authorized for use at indicated maintenance categories.
M	Applied to repair parts which are not procured or stocked but are to be manufactured at indicated maintenance categories.
A	Applied to assemblies which are not procured or stocked as such, but made up of two or more units, each of which carry individual stock numbers and descriptions and are procured and stocked and can be assembled by units at indicated maintenance categories.
X	Applied to parts and assemblies which are not procured or stocked, the mortality of which is normally below that of the applicable end item, and the failure of which should result in retirement of the end item from the supply system.
X1	Applied to repair parts which are not procured or stocked, the requirement for which will be supplied by use of the next higher assembly or components.
X2	Applied to repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain them through cannibalization; if not obtainable through cannibalization,

Note. Source code and level of maintenance are shown on common hardware items known to be readily available in Army supply channels and through local procurement.

(2) Maintenance code indicates the low category of maintenance authorized to install listed item. The maintenance level code is

Code	Explanation
R	Applied to repair parts (assemblies and components) which are considered economically repairable direct and general support maintenance level. When the maintenance capability to repair these items does not exist, they are normally disposed of at the GS level. When supply considerations dictate, some of these repair parts may be listed for automatic return to supply for depot level repair as forth in AR 710-50. When so listed, they will be placed by supply on an exchange basis.

T	Applied to high dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts are normally repaired or overhauled at depot maintenance activities.
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U	Applied to repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, high dollar value reusable casings and castings.
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b. *Federal Stock Number, Column (2).* This column indicates the Federal stock number for the item.

c. *Description, Column (3).* This column indicates the Federal item name and any additional description of the item required. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturers in parentheses. Repair parts quantities included in kits, sets, and assemblies are shown in front of the repair part name.

d. *Unit of measure, Column (4).* This column indicates the unit used as a basis for issue, e.g., pr, ft, yd, etc.

e. *Quantity Incorporated in Unit, Column (5).* This column indicates the actual quantity contained in the unit of measure.

the figure number of the illustration in which the item is shown.

(2) *Item number, column (7)(b)*. Indicates the callout number used to reference the item in the illustration.

B-4. Explanation of Columns in the Tabular List of Maintenance and Operating Supplies — Section III

a. *Component Application, Column (1)*. This column identifies the component application of each maintenance or operating supply item.

b. *Federal Stock Number, Column (2)*. This column indicates the Federal stock number for the

item and will be used for requisitioning purposes.

c. *Description, Column (3)*. This column indicates the item and brief description.

d. *Quantity Required for Initial Operation, Column (4)*. This column indicates the quantity required for each maintenance or operating supply item required for initial operation of the equipment.

e. *Quantity Required for 8 Hours Operation, Column (5)*. This column indicates the estimated quantities required for an average eight hour operation.

f. *Notes, Column (6)*. This column indicates informative notes keyed to data appearing preceding column.

Section II. BASIC ISSUE ITEMS

(1) SMR Code	(2) Federal Stock Number	(3) Description Ref No. & Mfr Code	(4) Unit of Meas	(5) Qty Inc in Unit	(6) Qty Furn with Equip	(7) Illustrat ion No.	
						(A) Fig No.	(B) Fig No.
PC	7510-889-3494	Binder, Loose Leaf: U.S. Army Equipment Log Book	EA		1		
PC	7520-559-9618	Case: Maintenance and Operational Manuals, Cotton Duck, Water Repellant, Mildew Resistant	EA		1		
PC	4210-889-2221	Extinguisher, Fire: Dry Chemical Hand Type, 2 1/2 lbs., FED. Spec. 0-E-915, Type III, Class 2, Size 2 1/2 Walter Kiddie P/N 874195 or Equal	EA		1		
		DA Lubrication Order LO 5-2420-206-12	EA		1		
		DA Technical Manual TM 5-2420-206-12	EA		1		
		DA Technical Manual TM 5-2420-206-20P	EA		1		

(1) Component application	(2) Federal stock number	(3) Description	(4) Quantity required to initial operation	(5) Quantity required 1/8 hrs operation	(6) Notes
CRANKCASE	9150-680-1089(2) 9150-680-1102(2) 9150-242-7603(2)	OIL, LUBRICATING: 5 gal can as follows: HDO 30 HDO 10 OES	40 qt 40 qt 40 qt	(3) (3) (3)	(1) Includes quantity or oil engine oil system as follows: 36 qts—crankcase 4 qts—oil filter
FUEL TANK	9140-286-5294(2) 9140-286-5286(2) 9140-286-5283(2) 2910-565-9424	FUEL OIL DIESEL: Bulk as follows: DF-2 Regular Grade DF-1 Winter Grade DFA- Artic Grade CYLINDER, FUEL	196 gal 196 gal 196 gal 1	(4) (4) (4) (4)	(2) See FSC C9100-IL for a data and requisitioning proce- (3) See current LO for gr- tion and replenishment inter- (4) Tank capacity
ENGINE STARTING AID ANEROID CONTROL	9150-265-9428(2) 9150-242-7603(2) 9150-265-9428(2) 9150-242-7603(2) 9150-265-9428(2) 9150-242-7603(2)	OIL, LUBRICATING: 5 gal can as follows: OE-10 OES OIL, LUBRICATING OE-10 OES OIL, LUBRICATING OE-10 OES OIL, LUBRICATING OE-10 OES OIL, LUBRICATING OE-10 OES OIL, LUBRICATING OE-10 OES	2 oz 2 oz 2 qt ea 2 qt ea 5 qts 5 qts	(3) (3) (3) (3) (3) (3)	
BRAKE RESERVOIR	9150-265-9428(2) 9150-242-7603(2)	OIL, LUBRICATING OE-10 OES	2 qt ea 2 qt ea	(3) (3)	
BEARING BOX	9150-265-9428(2) 9150-242-7603(2)	OIL, LUBRICATING OE-10 OES	5 qts 5 qts	(3) (3)	
TRANSMISSION AND TORQUE CONVERTER	9150-265-9428(2) 9150-242-7603(2)	OIL, LUBRICATING OE-10 OES	72 qts 72 qts	(3) (3)	
HYDRAULIC RESERVOIR	9150-265-9428(2) 9150-242-7603(2)	OIL, LUBRICATING OE-10 OES	500 500	(3) (3)	
RADIATOR	6850-243-1990 6850-174-1806	WATER Ethylene, Glycol ANTIFREEZE: 55 gal drum as follows: Compound Artic LUBRICATING OIL, GEAR: 5 gal drum as follows: GO-90 GO-90	84 qts 84 qts 84 qts 84 qts	(3) (3) (3) (3)	
DIFFERENTIALS FRONT AND REAR	9150-577-5844(2) 9150-257-5440(2)	34 1/2 qts ea 34 1/2 qts ea	(3) (3)		

(1) Complaint application	(2) Federal stock number	(3) Description	(4) Quantity required of initial operation	(5) Quantity required 1/8 hr operation	(6) Notes
LUBRICANTES FRONT AND REAR	9150-577-8544(2) 9150-257-5440(2)	LUBRICATING OIL, GEAR: 5 gal drum as follows: GO-90	13 qts ea	(3)	
LUBRICANTES PASE POINTS	9150-190-0907(2)	GOS GREASE, AUTOMOTIVE AND ARTILLERY: 35 lb pail as follows: GAA	13 qts ea	(3)	

APPENDIX C

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

1. General

- a. This section provides a general explanation of maintenance and repair functions authorized at various maintenance levels.
- b. Section II designates overall responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.
- c. Section III lists the special tools and test equipment required for each maintenance function as referenced from Section II.
- d. Section IV contains supplemental instructions, explanatory notes and/or illustrations required for a particular maintenance function.

2. Explanation of Columns in Section II

- a. **Group Number, Column (1).** The functional group is a numerical group set up on a functional basis. The applicable functional grouping indexes (obtained from TB 750-93-1), Functional Grouping Codes) are listed on the MAC in the appropriate numerical sequence. These indexes are normally set up in accordance with their functional proximity to each other.
- b. **Functional Group, Column (2).** This column contains a brief description of the components of each functional group.
- c. **Maintenance Functions, Column (3).** This column lists the various maintenance functions (through K) and indicates the lowest maintenance category authorized to perform these functions. The symbol designations for the various maintenance categories are as follows:

C — Operator or crew
O — Organizational maintenance
F — Direct support maintenance
H — General support maintenance
D — Depot maintenance

The maintenance functions are defined as follows:

- Inspect. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.
- Test. To verify serviceability and to de-

- D — Adjust. To rectify to the extent necessary to bring into proper operating range.
- E — Align. To adjust specified variables of an item to bring to optimum performance.
- F — Calibrate. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparisons of instruments, one of which is a certified standard of known accuracy, to determine and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.
- G — Install. To set up for use in an operational environment such as an implementation site or vehicle.
- H — Replace. To replace unserviceable items with serviceable assemblies, subassemblies, or parts.
- I — Repair. To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting and strengthening.
- J — Overhaul. To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) concept.
- K — Rebuild. To restore an item to a standard as nearly as possible to original or new condition in appearance, performance and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

- d. **Tools and Equipment, Column 4.** This column is provided for referencing by code the special tools and test equipment (Section III) required

a. Reference Code. This column consists of a number and a letter separated by a dash. The number references the T&TE requirements column on the MAC. The letter represents the specific maintenance function the item is to be used with. The letter is representative of columns A through K on the MAC.

b. Maintenance Level. This column shows the lowest level of maintenance authorized to use the special tool or test equipment.

c. *Nomenclature*. This column lists the name or identification of the tool or test equipment.

Number of tools and test equipment.

C-4. Explanation of Columns in Section I

a. **Reference Code.** This column consists of letters separated by a dash, both of which refer to Section II. The first letter refers to column 5 and the second letter references a maintenance function, column 3. A through K.

b. Remarks. This column lists information pertinent to the maintenance function being performed as indicated on the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

Group No	Activity Group	Activity	Function											
			A	B	C	D	E	F	G	H	I	J	K	
			Inspect	Test	Service	Adjust	Align	Calibrate	Install	Replace	Repair	Overhaul	Rebuild	
06		Electrical System												
	0601	Generator												
		Generator assy	O	O	C	O				O	O		D	
		Belt	C							O				
	0602	Generator, Regulator												
		Regulator voltage	O	O		F				O	H			
	0603	Starting Motor												
		Motor, cranking	O	O	O					O	O		D	
		Solenoid	O	O						O	O			
		Plunger								O	O			
		Drive clutch	O							F	O			
		Wiring	O											
	0607	Engine Control Panel												
		Gages	O							O				
		Switches, lights, panel & circuit breakers		O						O				
		Bulbs	C							C				
		Wiring panel	C							O	O			
		Panel	O							O				
	0608	Miscellaneous Items												
		Utility outlet	C							O				
		Receptacle, battery	C							O				
	0609	Lights												
		Light assemblies	C		C					O				
		Lamp incandescent	C							C				
	0610	Sending Units & Warning												
		Switches												
		Sending units		O						O				
		Warning switch, over speed device		O						O				
	0611	Horn												
		Horn, Vehicular & warning		O						O				
		Wiring	O							O				
	0612	Batteries, Storage												
		Batteries	C	O	C					C	O			
		Wiring								C	O			
	0613	Hull or Chassis Wiring												
		Harness												
		Harness wiring								F	O			
07		Transmission												
	0704	Control shaft	C							O				
	0710	Transmission Assy	C		O					F	H		D	
	0713	Intermediate Clutch												
		Clutch assemblies								H	H			
	0714	Servo Unit												
		Control valve	C							F	F			
	0720	Accessory Drive								F	F			
		Speedometer drive												
	0721	Coolers, Pumps, Motors												
		Pump, push start								O	F			

Group No.	Group	(2) Assembly Group	(3) Maintenance Functions										Total Eq
			A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	
1410		Hydraulic Pump Pump assy									F	F	
1411		Hoses, Lines & Fittings Hoses, lines & fittings	C								O		
1412		Hydraulic Cylinders Cylinder, hydraulic	C								O	O	
15		Frame Frame assembly											
	1501	Frame	C								H	O	
		Rock guards, ladders	C									O	
	1503	Pintles & Towing Attach- ments Lunette	C			C					O	O	
		Pintle	C									O	
18	1506	Universal Coupler Coupler, universal	C		C						F	F	
		Body, Cab, Hood Body, cab, hood											
	1801	Body, cab	C								F	O	
		Hod	C								O	O	
		Glass	C										
22	1805	Floors Floorplates									O		
	1806	Seats Seat	C								O		
		Seat-belt	C								O	O	
	1808	Tool Box Box, tool	C								O	O	
		Body Chassis or Hull & Accessory Items											
43	2202	Accessory Items											
		Wiper assy	O									0	
		Blade	O									0	
	4300	Hydraulic & Air System Hydraulic system											
		Hydraulic system	C		C							0	
4301	4301	Strainers, Filters, Hose Lines, & Fittings											
		Strainers, filters	C		C							0	
		Hose, lines & fittings	C		C							0	
		Swivels	C		C							0	
	4302	Pump & Pump Drive Pump hydraulic	C								F	F	
4305		Drive, pump									H	H	
		Control Valves Valves, control									0	0	
	4307	Hydraulic Cylinders Cylinder, hydraulic	C								0	0	
	4308	Reservoir Reservoir assy	C								0	0	

(1) Group No	(2) Assembly Group	(3) Maintenance Functions										(4) Tools and Equipment		(5) Remarks
		A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild		
4701	Gages, (Non-Electrical) Instruments Speedometer & drive shaft.....	C	0						0		F			
	Adapter.....								F					
	Tachometer.....	0							0					
	Adapter.....		0						0					
4702	Gages, Mounting Lines & Fittings Gages, mounting lines & fittings.....		0							0				
4703	Hourmeter Hourmeter.....	0								0				
5001	Pneumatic Equipment.....									F		F		
	Cylinder & Head Assy Cylinder & head assy.....													
5002	Crank Shaft Assy Crank shaft assy.....									F		F		
5004	Piston, Connecting Rod & Rings Piston, connect- ing rod & rings.....	F								F				
5005	Valves Valves.....	F								F				
5007	Compressor Drive Compressor drive.....	F								F				
5008	Air Intake Air Intake.....	F								F				
5009	Unloader System Components Unloader system components.....	F								F				
5012	Throttling Devices Governor.....									F		F		
5015	Air Discharge System Lines & fittings.....	0								0				
7435	Earth Moving Components Moldboard assy Moldboard assy.....									0		H		
7440	Scarifier Assy Scarifier assy.....									0		0		
7447	Push Beam & Yoke Components Push beam & yoke components.....									0		0		

Reference Code	Maintenance level	Nomenclature	Tool number
1-1	F	Grooving Tool, Injector Sleeve Installation (Cummins Diesel Co. Topic No. 2-73A)	ST-1100

Section IV. REMARKS

Reference code	Remarks
A-B	Compression test
B-C	Oil pump sump screen
C-I	Weld only
D-I	Weld only
E-C	Clean impeller and diffuser only
F-I	Weld only
G-I	Repair kit only
H-I	Repair kit only
I-B	Test after welding
J-I	Weld only
K-I	Includes welding as required
L-I	Weld only
M-I	Weld only

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Order of the Secretary of the Army:

W. C. WESTMORELAND
General, United States Army
Chief of Staff.

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KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

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